Improving Hand Hygiene in a Rural Critical Access Hospital

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Abstract

Background: Hand hygiene adherence is the single most important infection control practice among healthcare workers. Hand hygiene is cost-effective and adherence to protocols can reduce hospital-acquired infections. Research regarding hand hygiene adherence has been shown to improve patient safety and reduce hospital-acquired infections. Adherence to hand hygiene protocols among healthcare workers is poor and improvement efforts lack sustainability.

Purpose: The purpose of this project is to improve hand hygiene to be at or greater than 90% in acute care areas of a critical access hospital.

Target population: The target population includes clinical and non-clinical staff working in a 7-

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bed emergency department and a 24-bed acute medical-surgical unit of a rural critical care hospital in North Carolina.

Method: The Model for Improvement was used to guide the aims, measures, and change. Process improvement was conducted using Plan-Do-Study-Act (PDSA) test cycles method.

Findings: Two acute care units were monitored for 3 months during which interventions occurred over two PDSA cycles. One unit showed steady improvement each month but did not meet its goal. The other unit exceeded goal metrics in the first and third months of the monitoring period.

Conclusions: Surveys, verbal reminders, and interventions created discussions and greater awareness of hand hygiene.

Keywords: hand washing, compliance, adherence, rural, critical access

Improving Hand Hygiene in a Rural Critical Access Hospital

Hand hygiene (HH) is essential for infection prevention (McFee, 2009). Ignaz Semmelweis recognized in the nineteenth century the importance of HH when he hypothesized that the lack of HH was causing childbirth fever resulting in maternal death. Dr. Semmelweis may have initiated the first HH program when he required hand washing at Krankenhaus teaching hospital (Kadar et al., 2018). Poor HH continues to cause hospital acquired infections (HAI) (Centers for Disease Control and Prevention [CDC], n.d.-a).

Patients who suffer a HAI are less likely to report a satisfactory hospital stay, which can affect a hospital's reputation and reimbursement. The avoidable costs for HAIs in the U.S. range between $142 million and $4.25 billion dollars annually (Schmier et al., 2016). According to CDC data HAIs are the most common cause of an adverse hospital event lengthening hospital stays and causing more than 99,000 deaths annually in the US. The pandemic caused by the virus; SARS-

CoV-2, commonly referred to as COVID-19, has hospitals looking more closely at infection prevention including HH (CDC, n.d.-a).

Background

Although recommendations for personal protective equipment (PPE) use, inpatient hospital visiting, as well as other foci changed due to the pandemic, HH has been a constant recommendation. Over forty years ago handwashing was recommended to improve patient safety and reduce HAIs (Vermeil et al., 2019). With the focus on HH over the years and with a pandemic, one may assume that all healthcare workers (HCWs) practice regular HH. However, adherence to HH protocols and policies remains a struggle in healthcare organizations (CDC, n.d.-a).

Bucher et al. (2015) recognized that emergency care providers working in pre-hospital environments such as homes, public areas or at traffic accidents have increased risks of spreading infections. In critically ill patients where registered nurses are the primary providers of care, poor HH places patients at increased risk of sepsis (Fox et al., 2015). In fact, HCWs perform HH half the time when presented with a HH opportunity (CDC, n.d.-a). Zhou et al. (2020) detail recommendations in their study and include how HCWs are observed and assured that the observed practice of HH met all the criteria such as number of seconds cleansing the hands. For this quality improvement (QI) project, the term used for empowering staff to determine to practice HH is adherence, those who practice HH are practicing adherence to infection prevention. Compliance could indicate that staff are merely complying with what they have been directed. Staff are expected to clean their hands according to policy and in doing so are compliant. Adherence indicates they are electing the practice of HH from knowledge of an evidence-based practice.

Problem Statement

This project asks the following clinical question: What is the impact of a HHQI effort on HCWs' HH adherence rates in a rural critical access hospital (CAH) comparing pre-intervention and post-intervention data over a three-month monitoring period? The population is defined as HCWs in the acute areas of the hospital, two units, the ED and the Acute Medical-Surgical Unit, the expected improvement is HH adherence at or greater than 90%, the comparison is the pre-intervention data and the post-intervention data results. The expected outcome is sustained improvement after interventions.

Review of the Literature

The World Health Organization (WHO) launched the World Alliance for Patient Safety in 2004 with a campaign of clean care is safe care (WHO, 2004). A feature in this campaign was promoting HH (Vermeil et al., 2019). Biddle (2009), in an update on the conditions of nurse anesthetists' workstations, recognized a connection between nurse anesthetists' work areas, and infection rates of patients.

The CDC has looked closely at HCWs barriers to HH practices. Barriers include inconvenient or lack of available HH products or stations, a lack of time to perform HH or concern over disease transmission, and the HCW may have skin irritation from frequent HH, or the products used. The lack of knowledge regarding the healthcare organization's protocols and policies, HH technique, and the belief that wearing gloves prevents disease transmission are other barriers noted (Pittet, 2001; Marra & Edmond, 2014).

Individual beliefs and behaviors are influenced by education and attitudes within the healthcare setting. There must be minimal effort to perform HH and few barriers to practice for an increase in adherence. The awareness of the importance of HH can be improved through education

and training in the appropriate methods, location of products and HH stations and skin protection methods is necessary (Alemagno et al., 2010).

The WHO (2009) presented a multimodal plan for improving HH, entitled; "5 Moments for Hand Hygiene" listing the moments a HCW should clean their hands. In addition, programs have been designed to increase HH awareness through online learning programs (Alemagno, 2010). De Wandel et al. (2010) reviewed the behaviors that determined when intensive care unit (ICU) nurses were more likely to perform HH. Sadule-Rios and Aguilera (2017) found key barriers to HH were increased workload, reduced staff, lack of time, and inappropriately placed HH equipment. Achieving HH adherence to protocols and policies continues to be a key challenge in healthcare organizations (Boyce, 2019). The QI project focuses on evidence-based methods to improve HH adherence rates in a rural CAH.

Goals, Objectives, and Expected Outcomes

The primary goal of the project was to increase HH adherence in the hospital's acute care areas and to sustain this improvement. Secondary goals included improvement in staff knowledge of the importance of HH, related policies, pandemic safety processes, and improved understanding of perceived barriers to adherence with HH protocols. Pre-intervention surveys were used to measure staff HH practice understanding, identify the perceived barriers, and help guide the interventions phase of the project. A post-intervention survey measured whether the interventions were successful.

Expected Outcomes

The expected outcome is a documented sustained HH adherence rate of greater than 90% in acute care areas over three months post interventions. Interventions began in May 2021 with efforts to capture all members of the population through rounding, posting flyers, staff meetings, and

online education. A post-intervention survey was performed after the three-month monitoring period.

Project Design

Project Clinical Site

The project was conducted at a rural CAH in North Carolina (NC). According to the NC Office of Rural Health (ORH) (NC Department of Health and Human Services [NCDHHS], n.d.), a rural health facility is one that the NC ORH considers to be underserved by healthcare providers and clinicians. NC ORH assists hospitals that have this designation with provider recruitment, grant funding and other resources. The clinical site is in a county with no metropolitan area and less than 50,000 residents (NCDHHS, n.d.). In the clinical setting, alcohol-based hand sanitizer is at the entrance to every patient room and inside the door in both the acute medical-surgical unit and the ED. There are soap and water hand washing sinks located throughout both units. In the ED, hand washing sinks are in every room in addition to the alcohol-based hand sanitizer stations. Hand hygiene monitoring is done by trained observers who report findings to the hospital's infection prevention staff.

The clinical site employs an infection preventionist (IP) who deploys HH observers who have been trained to use observational techniques to quantify adherence to HH protocols. The IP is shared between three rural CAH. Hand hygiene should be performed before and after patient contact, before donning and after doffing gloves, before an aseptic procedure, and after any contact with body fluids (CDC, n.d.-b). The clinical site is accredited by The Joint Commission (TJC) and policies uphold TJC standards. Hand hygiene performed with alcohol hand sanitizer is an acceptable practice except in the care of patients infected with Clostridioides difficile, which requires soap and water HH (CDC, n.d.-a)

Staff trained as HH observers maintain their positions and, as an additional duty, observe for HHO and HH reporting their findings to the hospital's IP. Each HHO is one data point. Data is measured as to the number of observations, the frequency, median, and percentage of HH adherence. Collected data for the project has been analyzed with the assistance of IntellectusStatistics™ software (n.d.).

Hand Hygiene Products

The clinical site uses soap and water for debris removal and alcohol-based hand sanitizer to reduce microbe transmission at the entrance and exit to each patient room and in all clinical areas. Hand sanitizer dispensers are also placed outside of offices and key departments such as pharmacy, lab, and therapy services. There are signs on each patient's door reminding those who enter to clean their hands before entering the patient room.

Population of Interest

The population of interest is the clinical and non-clinical staff working in acute care areas, which include a 7-bed ED and a 24-bed acute medical-surgical unit. Staff in these areas includes registered nurses, healthcare providers, ancillary staff, housekeeping, dietary, therapy, case management, pharmacy, laboratory staff members, and hospital leaders. Registered nurses are the largest portion of staff. Recruitment, hiring and retention of nurses continues to be a challenge in rural hospitals (Adams, 2016).

The project focuses on the acute medical-surgical unit and the ED. Staff in both areas may also work in the outpatient area, cardiac rehab, or in the long-term care facility that adjoins the hospital. It is likely that practice behaviors seen in the two focus units exist when staff float or work in other areas.

Observation

Direct observation is considered the gold standard for the collection of HH data (Kingston et al., 2015). Direct observation is the process for data collection at the clinical site. Hand hygiene opportunities are those prior to and post interaction with the patient.

Method

This QI project is designed using the Model for Improvement developed by the Associates in Process Improvement (apiweb.org, n.d.). This model asks three questions:

1. What are we trying to improve?
2. How will we know that a change is an improvement?
3. What change can we make that will result in improvement?

These three questions help guide a project by identifying the aim, measures, and change (apiweb.org, n.d.) Process improvement was conducted using Plan-Do-Study-Act (PDSA) test cycles method. The PDSA method is a four-step model and commonly used in QI projects. The planning phase includes stating the desired outcomes and predictions. The "do" phase, is the plan implementation. Results of the implementation are analyzed in the study phase. Step four is the decision to act based on the analysis of data (Christoff, 2018).

Implementation

The project began with the project proposal approval from the clinical site's Nursing Education and Research Council. The project was then submitted for Institutional Review Board (IRB) approval and was found to be exempt by the IRB. A strength, weakness, opportunity, and threats analysis (SWOT) assessed internal and external conditions to determine readiness for implementation. The pre-implementation survey of staff assisted in understanding reasons why staff decides not to perform HH. A review and synthesis of the literature helped to determine strategies for developing and implementing a sustainable improvement plan.

Interventions

1. Placement of additional signage in the emergency department with signage obtained from infection prevention.

2. Making the hand hygiene policy available on each unit allow staff to reference this material as time allows. This intervention supports a secondary goal of the project to improve staff knowledge. Literature links a lack of knowledge regarding healthcare organization policies to poor hand hygiene adherence (Pittet, 2001).

3. Use of an online training tool on HH and products used at the clinical site. Health Care Workers' knowledge on when and how to perform HH has been identified as a barrier to greater HH adherence (O'Boyle et al., 2001). The online education tool allowed for a video demonstration and convenient learning and is designed to increase HH adherence (Alemagno, 2010).

4. Placement of a flyer presenting the WHO's five moments for HH on each targeted unit (WHO, 2009).

5. The HH flyer and policy were presented at staff meetings reinforcing evidence-based practice. These verbal presentations were used as a method to promote HH.

6. Verbal reminders during daily staff huddles on HH.

The online education tool was assigned by clinical education and professional development leadership at the clinical site. Clinical education and professional development gave hospital staff through June to complete the online education tool. Clinical education reported 100% completion of the education tool by June 30, 2021.

Measurement and Tools

The U.S. Department of Health and Human Services (HRSA) (2011) noted that how things are done is the system of processes an organization engages in. To assist organizations in better defining and improving the process, HRSA described four principles needed in QI work, shown in Table 1.

Table 1

Principles Needed in Quality Improvement

Four Key Principles of Quality Improvement
1. QI work as systems and processes
2. Focus on Patients
3. Focus on being part of the team
4. Focus on use of the data

Current processes used to improve HH adherence are education, during the orientation period and annually, HH trained observers and re-education. COVID-19 brought robust education focused on PPE and HH as a means of reducing the spread of the virus among HCWs and patients (Moore et al., 2021). The process for education and data collection and analysis at the clinical site has remained consistent to the processes prior to the pandemic.

Surveys

Pre-implementation surveys were completed by staff using a modified WHO HH questionnaire to establish baseline knowledge and perception of HHO and HH practices (WHO, 2009). The results of this survey were used to guide the educational components and interventions of the project. A post implementation survey was completed at the end of the monitoring period and included the same questions as the pre-implementation survey with two additional questions. One question that had been added is whether the person taking the survey completed a survey in the past. The second question evaluates the education and methods to increase HH adherence. Data

Files for the pre-intervention and post-intervention surveys were loaded into IntellectusStatistics™ project software for data project management. Project datasets for both surveys were analyzed using descriptive statistics applications. Summary statistics were calculated for each interval and ratio variable. Frequencies and percentages were calculated for each nominal variable. The surveys were not numbered, who completed the surveys was not known to the authors.

Results

Participation in pre-intervention and post-intervention surveys was voluntary and open to staff members working in either of the acute care areas. Clinical education made surveys available to hospital staff, providing instructions to place completed surveys in the mailbox for clinical education. At the end of two weeks, the surveys were collected from the mailbox and reviewed. Of the 45 clinical staff members working in the acute medical-surgical unit and the ED during the pre-intervention survey, 27 surveys were returned for a response rate of 60%.

In the time from the pre-intervention survey to the post-intervention survey, there was staff turnover. The exact number of staff remained the same, with permanent staff replaced with travel staff as new employees were hired and oriented. Travel staff were invited to participate in the post-intervention survey. The post-intervention survey was made available during the first whole week in in the month following the three-month monitoring period using the same procedure as the pre-intervention survey. With the same total number of staff members working in each department, 29 post-intervention surveys were returned for review and analysis. Post-intervention surveys had a response rate of 64%.

Pre-intervention Survey

The most frequently observed category of gender was female (n = 19, 70%). The most frequently observed category of profession was nursing (n = 21, 78%). Frequencies and percentages of the categories gender and profession are presented in Table 2.

Table 2

Frequency Table for gender and profession

Variable	*n*	*%*
Gender		
female	19	70.37
male	8	29.63
Profession		
nursing	21	77.78
therapy	5	18.52
respiratory therapist	1	3.70

Survey questions 4 through 13 were analyzed, the responses to this group of questions allowed for the identification of barriers and knowledge. The results of questions 4 through 13 are found in Table 3.

Table 3

Frequency Table for Pre-Intervention Survey: Questions 4 through 13. N=27

Variable	*n*	*%*
4 HH training in the last 3 years		
Yes	24	88.89
No	3	11.11
5 Use alcohol hand sanitizer?		
Yes	26	96.30
No	1	3.70
6 Are unclean hands a route of cross transmission?		
Yes	24	88.89
No	3	11.11
7 Are unclean surfaces responsible for HAIs?		
Yes	13	48.15
No	14	51.85
8 HH before patient contact prevent germ transmission?		
Yes	26	96.30
No	1	3.70
9 HH after patient contact prevent transmission of germs to the HCW?		
Yes	25	92.59
No	2	7.41
10 Alcohol based sanitizer is more effective than soap and water?		
No	22	81.48
Yes	5	18.52

11 Hand scrub for 20 seconds?		
No	4	14.81
Yes	23	85.19
12 Is alcohol hand sanitizer an acceptable HH after glove removal?		
No	6	22.22
Yes	21	77.78
13 Should artificial nails be avoided?		
Yes	26	96.30
No	1	3.70

Hand Hygiene Adherence

Acute Medical-Surgical Unit

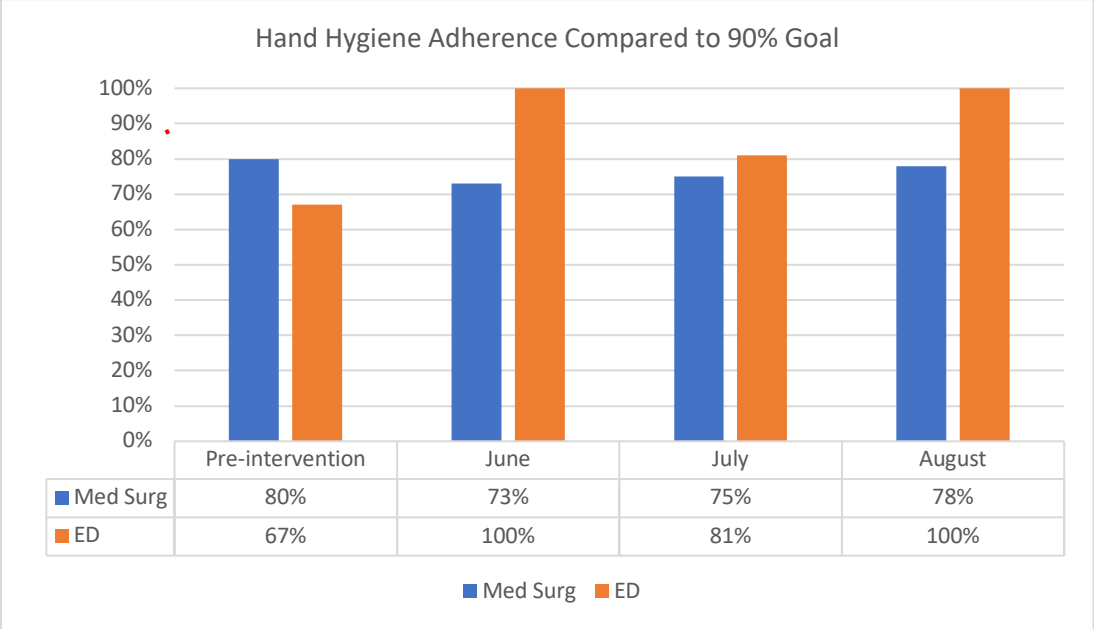
The three-month monitoring period began in June 2021. The baseline data for the acute medical-surgical unit was 80% HH adherence. During the three-month monitoring period, the adherence rate never met the baseline of 80%. Steady improvement was shown each month, with the highest HH adherence rate achieved of 78% in August of 2021, below the goal of 90%.

Emergency Department

The baseline data for the emergency department was 67% HH adherence. The emergency department exceeded goal two of the three months during the monitoring period. During July, the emergency department had a HH adherence rate of 81%, while not meeting the goal of 90%; this rate is improved over the baseline of 67%. In June and August, the emergency department had 100% adherence for all observed HH opportunities. Figure 1 illustrates the HH adherence of both units.

Figure 1

Hand Hygiene Adherence Across Both Units



	Pre-intervention	June	July	August
Med Surg	80%	73%	75%	78%
ED	67%	100%	81%	100%

Post-Intervention Survey

A post-intervention survey conducted at the end of the monitoring period included two additional questions. Question one asked if the participant had completed a similar survey earlier in the year and online education. The second question asked if they believe the education had increased their HH adherence.

Additional Questions

A Fisher's exact test was conducted to examine the relationship of the two additional questions in the post-intervention survey. The results of the Fisher exact test were significant based on an alpha value of 0.05, p = .003, suggesting that staff members who participated in the project as evidenced by taking the pre-intervention survey, were significantly more likely to report that HH education influenced their HH adherence. The questions: Have you completed a similar survey this year and if you completed HH education in 2021 did it influence you to increase your HH

adherence were found to be related to one another. Since the Fisher's exact test was conducted for a 2x2 contingency table, the odds ratio was calculated, OR = 12.77. This indicates that the odds of observing Have you completed a similar survey this year (Yes) and If you completed HH education in 2021 did it influence you to increase your HH adherence (Yes) is 12.77 times as likely as observing Have you completed a similar survey this year (No) and If you completed HH education in 2021 did it influence you to increase your HH adherence (Yes).

Frequencies and Percentages

Sixty-six percent (19/29) of the respondents were nurses and female. This finding is consistent with the findings in the pre-intervention survey. Table 4 presents the variables gender and profession.

Table 4

Frequency Table for Gender and Profession

Variable	*n*	%
Gender		
Female	19	65.52
Male	10	34.48
Profession		
Therapist	6	20.69
Technician	3	10.34
Nurse	19	65.52
Provider	1	3.45

Frequency and percentages for questions 4 through 13 statistics are found in Table 5.

Table 5

Frequency Table for Post-Intervention Survey: Questions 4 through 13. N=29

Variable	*n*	*%*
4 HH training in the last 3 years?		
Yes	28	96.55
No	1	3.45
5 Use alcohol hand sanitizer?		
Yes	28	96.55
No	1	3.45
6 Are unclean hands a route of cross transmission?		
Yes	26	89.66
No	3	10.34
7 Are unclean surfaces responsible for HAIs?		
Yes	24	82.76
No	5	17.24
8 Does HH before patient contact prevent germ transmission?		
Yes	28	96.55
No	1	3.45
9 Does HH after patient contact prevent transmission of germs to the HCW?		
Yes	28	96.55
No	1	3.45
10 Yes/No: Alcohol based sanitizer is more effective than soap and water?		
No	25	86.21
Yes	4	13.79

Variable	*n*	*%*
11 Hand scrub for 20 seconds?		
Yes	17	58.62
No	12	41.38
12 Is alcohol hand sanitizer an acceptable HH after glove removal?		
Yes	23	79.31
No	6	20.69
13 Should artificial nails be avoided?		
Yes	29	100.00
No	0	0

Discussion

The SWOT provided valuable information for the first PDSA cycle. The SWOT analysis allowed the author to view the problem and relate the considered interventions to the project's framework. In completing the SWOT, an immediate opportunity was identified to add additional signage in the ED. The additional signage gave an important reminder to ED staff to perform HH.

During PDSA cycle one, staff completed the online HH education module. This education module was specific to the HH products at the clinical site and had not previously been used for training staff. The module was an online tool allowing for pandemic social distancing. The education module included the amount of hand sanitizer needed to cover the hands and the lather created if using a soap and water method for HH. The amount of time needed for hand rubbing was covered. This education module supported the goals of this QI project, the organization's policy, the CDC guidelines, and the hospital's pandemic guidelines.

During this first PDSA cycle, the emergency department exceeded the goal for HH adherence with 100% HH adherence. The acute medical-surgical unit reached 73% HH adherence for the same month. The rise in HH for the emergency department during PDSA cycle one was immediately following the pre-intervention survey and the placement of additional signage. The pre-intervention survey provided awareness of HH for both units. The additional signage in the emergency department and the pre-intervention survey may have created a higher level of awareness than in the acute medical-surgical unit, where additional signage was not placed as already present. The online HH education module provided awareness of HH, and the knowledge needed to perform HH using the products available at the hospital.

During the second month of the three-month monitoring period, a second PDSA cycle was developed to improve the acute medical-surgical unit's HH adherence and sustain the emergency department's achievement. Clinical leadership included HH adherence as a topic during daily rounds and reviewed HH goals during daily multidisciplinary huddles in the acute medical-surgical unit. Other PDSA elements included posting and reviewing the five moments of HH and the organization's policy. To reinforce the elements of PDSAs, HH evidence-based practice reminders continued to be presented at staff meetings. In July, HH adherence in the acute medical-surgical unit improved to 75%, and in the ED dropped to 81%. Nursing leadership included HH reminders during one-on-one meetings. PDSA cycle two continued through the end of the three-month monitoring period. The final month saw the highest HH adherence for both units. The ED returned to 100% HH adherence, and the acute medical-surgical unit achieved 78% HH adherence.

During the second PDSA cycle, the most significant improvement in HH occurred. Interventions were continuous in both units. HH continued to be promoted during huddles, clinical

rounds, staff meetings, and one-on-one meetings with leadership. The HH policy remained posted at each nursing station, along with a poster on the five moments of HH.

A post-intervention survey was completed in September 2021 with a higher percentage of participation than the pre-intervention survey, 64% vs. 60% respectively. During the post-intervention survey, travel staff members had joined the acute medical-surgical team as permanent staff had resigned or retired. Due to the staff turnover, additional questions were added regarding if the survey participant had completed a similar survey and if they had participated in education, had the education improved their adherence to HH. A Fisher's exact test was completed on the two additional questions presented to survey participants. The results of the Fisher exact test were significant based on an alpha value of 0.05, $p = .003$, indicating a higher likelihood of HH adherence if the survey participant completed the pre-intervention survey.

During the QI project, the pandemic continued. There were frequent reminders at the clinical site regarding HH, and the staff was reminded of the risk of SARS-CoV-2 virus transmission. Despite the awareness of the danger of transmission of this virus, HH adherence achieved in the acute medical-surgical unit never obtained the goal of 90%. Pittet et al. (1999) found that lower HH compliance can occur during times of heavy workload. The pandemic created high workload situations globally (Grimm, 2021). The Institute of Medicine [IOM] (2004) recommended empowering nurses to speak up when quality is in danger.

Limitations

There were several limitations to the project. The project focused on one clinical site. A larger sample size may have created different focuses for the second PDSA cycle. Rural CAH staff often wear many hats and participating in a voluntary survey may have been more time-consuming than the staff wished to spend. Turnover in staff resulted in a change in participants from the pre-

intervention to the post-intervention survey. It is unknown to what extent the change in participants affected the results. A Fisher's Exact Test was used to mitigate the change in participants. This examined whether someone completing a survey had completed a similar survey during the calendar year and if they had completed HH education had it influenced them to increase their HH adherence. There were two levels in whether someone had completed a survey earlier in the year: Yes and No. There were also two levels in asking if they had completed HH education in 2021 and had the education influenced the participant to increase their HH adherence: Yes and No. Time was another limiting factor. With a third PDSA cycle, there may have been a more significant improvement.

This project took place during a pandemic when everyday processes changed frequently. Changes included changes in visiting hours, workload, the method in which staff training and meetings took place, and social distancing, causing decreased contact with colleagues. With staff changes, the project's focus may have had a lower impact on the target population. The outcomes may have differed if this project had been completed outside the pandemic. The pandemic made social interaction, face-to-face discussion, and training more complicated; this may have impacted the results.

Conclusion

This QI project was conducted to improve patient and staff safety, reducing opportunities for hospital-acquired infections by improving HH adherence to 90% or greater at the clinical site. During the COVID-19 pandemic, hand hygiene and other infection prevention activities have received much attention (Moore et al., 2021). However, the baseline hand hygiene at the clinical site was well below goal metrics. This project was needed to promote safety and health and was timely due to the COVID 19 pandemic.

Inappropriately placed HH equipment is not a barrier, and the online education was specific to the type of alcohol hand sanitizer at the clinical site. The education did not improve HH adherence in the acute medical-surgical unit. It did not yield sustained results in the emergency department, as evidenced by the second month of the monitoring period's rate dropping to 81%. With the implementation of the pre-intervention survey, there was an immediate rise in adherence in the emergency department. The second cycle PDSA included verbal reminders, these reminders and the pre-intervention surveys raised awareness and created discussions surrounding HH. It is possible that HH was improved through greater awareness and discussion. Had the signage, education, flyers, verbal reminders and surveys not taken place the discussion and awareness may not have surfaced.

A third cycle PDSA would include plans to place signs in all patient rooms encouraging patients and their families to ask each person if they had cleaned their hands before entering the room. Another consideration to encourage HH is a poster presentation on developing a practice discipline for HH.

In the IOM's (2011) report on the future of nursing, experts comment that the nursing profession can make changes in the practice and delivery of healthcare. Nurses have constant contact with patients and their families, along with the scientific knowledge to provide care. Nursing and other HCWs must decide to incorporate HH as part of their professional practice.

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