

INFECTION CONTROL IN THE LONG-TERM CARE SETTING

INFECTION PREVENTION AND CONTROL PROGRAM IN THE LONG-TERM CARE  
SETTING TO IMPROVE INFECTION PREVENTION AND CONTROL

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# INFECTION CONTROL IN THE LONG-TERM CARE SETTING

## Abstract

Infection prevention and control (IPC) is important in all healthcare settings to prevent the spread of diseases and reduce the number of healthcare acquired infections (HAIs). In the long-term care setting, the elderly is at an increased risk of contracting HAIs due to many having multiple chronic diseases that predispose them to infections, as well as living in close quarters with other elderly individuals who are at an increased risk. For these reasons, proper IPC practices are essential in the long-term care setting. The purpose of this evidence-based quality improvement project was to implement an infection prevention and control (IPC) program at Hawaii Kai Assisted Living (HKAL) facility to improve the nursing staff's knowledge and practices regarding IPC. The IPC training spanned two weeks, consisting of four training sessions. Evaluation methods used included a pre/post-test and a portion of an IPC program evaluation (IPCPE) tool. It was found that there was a 12.2% increase in IPC test scores post-training compared to pre-training. According to the IPCPE tool, the nursing staff also exhibited partial compliance to interventions to improve IPC. In conclusion, the results of this IPC project were positive, with the nursing staff improving their knowledge while also meeting partial compliance in IPC practices. Further training is needed to reach full compliance, as well as expansion of the IPC program. The results of the evaluation will be shared with the DON and administrators of the facility to provide data to further improve IPC practices amongst the nursing staff at HKAL.

# INFECTION CONTROL IN THE LONG-TERM CARE SETTING

## Table of Contents

Abstract .....	ii
Description of Problem .....	1
Literature Review and Synthesis .....	2
Literature Synthesis .....	3
Barriers to IPC .....	3
IPC programs in the LTC setting .....	3
Hand-Hygiene .....	3
Strength and Limitations of Literature .....	4
Practice Change .....	4
Conceptual Framework .....	5
PICO Question .....	5
Methods and Procedures.....	6
Purpose Statement and Project Objectives.....	6
Project Plan.....	6
Setting .....	6
Participants.....	7
Procedures.....	7
Human subject consideration .....	7
Measurements .....	8
Data Collection Procedure .....	8
Data Analysis .....	9

# INFECTION CONTROL IN THE LONG-TERM CARE SETTING

Results .....	9
Discussion .....	10
Limitations .....	11
Recommendations for Clinical Practice and Future Study .....	12
Conclusion .....	13
References .....	14
Appendix A .....	18
Appendix B .....	19
Appendix C .....	24
Appendix D .....	25
Appendix E .....	26
Appendix F .....	27
Appendix G .....	29
Appendix H .....	30
Appendix I .....	31

# INFECTION CONTROL IN THE LONG-TERM CARE SETTING

## Infection Prevention and Control Program in the Long-Term Care Setting to Improve IPC Practices and Improve Patient Outcomes

An estimated 8 million people comprise the long-term care (LTC) population in the United States (Centers for Disease Control and Prevention [CDC], 2014). With the aging population increasing at a rapid pace, more people will need long-term care in the near future. In 2012, there were 43 million people aged 65 and over; by 2050, that population is estimated to almost double to 87 million (Ortman, Velkoff, & Hogan, 2014). The elderly are a particularly vulnerable population due to their declining health and many comorbidities, resulting in a weakened immune system leaving them susceptible to infections. Those living in the LTC setting are also at an increased risk for acquiring communicable infectious diseases due to living in close quarters with other elderly individuals, increasing their exposure to these diseases considerably. This proposal for an infection prevention and control (IPC) program will be implemented at Hawaii Kai Assisted Living (HKAL) facility.

### **Description of the Problem**

In 2012, infectious diseases accounted for more than 3.1 million emergency department (ED) visits in the elderly population in the United States (Goto, Yoshida, Tsugawa, Camargo, & Hasegawa, 2016). A significant problem in the LTC setting is health care acquired infections (HAIs). An estimated 1.6 to 3.8 million HAI occur annually in the LTC setting, at an annual cost of \$137 million for antimicrobial therapy and approximately \$637 million to \$2 billion for hospitalizations annually (Cohen, Choi, & Stone, 2016). Infections account for 13.5% of all ED visits of elderly adults, greater than myocardial infarctions and CHF (Goto et al., 2016). It is also estimated that 380,000 people die of infections in LTCFs each year (CDC, 2015).

## INFECTION CONTROL IN THE LONG-TERM CARE SETTING

HKAL does not have existing IPC policy, program, or personnel. Furthermore, because the acuity is assisted living (AL) and not a skilled nursing facility (SNF), there is no regulatory agency that monitors IPC practices, which puts the residents at an even greater risk for developing HAIs. The facility also does not track HAIs and uses paper charting, making collecting baseline data difficult. HKAL is making IPC a priority to help reduce staff illness, as well as to increase protection for the residents.

### **Literature Review and Synthesis**

#### **Literature Search Strategy**

PubMed and CINAHL were searched for key words: “infection control,” “infection outbreak,” “assisted living,” “long-term care,” “influenza,” “spread of infection,” “infection prevention,” and “infection control policy.” Limits and filters used included articles published from 2000-present, target age 65+ years, peer reviewed, and in English. This search strategy yielded 72 articles, which were further narrowed by reviewing titles, abstracts and the bodies of the work to determine which articles would be the most relevant to the study. The result was 17 articles that were relevant to the project topic and problem. They included systematic reviews, randomized controlled trials, non-randomized controlled trials, cross-sectional studies, and cohort studies.

#### **Grading Tool and Level of Evidence**

The level of evidence of each article was graded using Mosby’s Level of Evidence Ranking Tool (Ackley, Swan, Ladwig, & Tucker, 2008). Appendix A shows the level of evidence of each type of study. The level of evidence of the 17 articles can be found in the Literature Matrix located in Appendix B. The ranking of the evidence for this project includes

## INFECTION CONTROL IN THE LONG-TERM CARE SETTING

three Level 1 studies, three Level 2 studies, two Level 3 studies, eight Level 4 studies, and one Level 6 study. Of the eight Level 4 studies, seven were cross-sectional in design.

### **Literature Synthesis**

**Barriers to IPC.** Lack of IPC knowledge and training among the nursing staff in the LTC setting was seen as a barrier to practicing proper IPC (Burdall et al., 2017; Herzig et al., 2015; Kossover et al., 2014; Roup, Roche, & Pass, 2006; Travers et al., 2015). Barriers to proper IPC in the LTC setting have been related to a lack of resources (specifically funding and time) allocated to the training of IPC personnel (Herzig et al., 2015; Roup et al., 2006). By improving IPC knowledge among the nursing staff at HKAL and providing current up-to-date resources, they will then have the tools needed to practice proper IPC.

**IPC programs in the LTC setting.** Comprehensive IPC programs have been noted to increase health care workers knowledge regarding IPC interventions and practices, as well as reduce HAIs (Chami et al., 2000; Kaur, Stone, Travers, Cohen, & Herzig, 2017; Makris, Morgan, Garber, Richter, & Rubino, 2000). Comprehensive programs include education and training regarding proper hand-hygiene, chain of infection, disease transmission and prevention, cleaning and disinfecting environmental surfaces, and providing the facility with the supplies needed for IPC (Makris et al., 2000). Implementing an IPC program with similar themes can help to train the nursing staff at HKAL and address current issues related to ineffective IPC.

**Hand-Hygiene.** Proper hand-hygiene is a primary preventive measure in reducing the contraction of infections and occurrence of outbreaks. A majority of the articles found regarding IPC in the LTC setting was focused on increasing hand-hygiene knowledge and practices among health care workers (HCW) (Koo et al., 2016; Lee, Yu, Ip, & Tang, 2017; Makris et al., 2000; Schweon, Edmonds, Kirk, Rowland, & Acosta, 2012). Several research studies (Schweon et al.,

## INFECTION CONTROL IN THE LONG-TERM CARE SETTING

2012; Kingston, O-Connell, & Dunne, 2015; Sassi et al., 2015) determined that the provision of hand-hygiene training sessions increased HCW knowledge regarding proper hand-hygiene. The resident assistants (RAs) at HKAL are not Certified Nurse Aides (CNAs), which means they did not go through official training regarding proper hand-hygiene, creating a greater need for hand-hygiene education and training.

### **Strength and Limitations of Literature**

A strength of this review is that greater than 80% of the literature supports the need for a comprehensive infection control program in the long-term care setting. An additional strength is that most of the articles included in the search were within the last 10 years, showing that the problem of inadequate infection control programs is relevant to the health care setting today. A major limitation relates to the strength and level of evidence as determined by Mosby's Level of Evidence Ranking Tool (Ackley et al., 20018). The majority of the studies regarding infection control in the long-term care setting found for this review are cross-sectional studies, which have a lower level of evidence. There is also limited research related to infection control in the long-term care setting, with many studies reporting on the acute care setting. More research, as well as systematic reviews and meta-analyses, need to be conducted to improve the level of evidence of the literature as a whole.

### **Practice Change**

HKAL experienced similar barriers to IPC found in the literature, including limited resources and a lack of training regarding IPC (Herzig et al., 2015 ; Roup et al., 2006) ; thus the practice change was intended to address these factors. To address limited resources, the number of hand-hygiene stations (HHS) throughout the facility was doubled with an additional 10 stations. The Executive Director (ED) of the assisted living portion of the facility is responsible

## INFECTION CONTROL IN THE LONG-TERM CARE SETTING

for stocking inventory and worked with Ecolab, who currently supplies the hand-sanitizer and soap dispensers at the facility, to increase the number of hand-hygiene stations available.

To address lack of training, nursing staff attended training sessions. The session included a PowerPoint presentation modified to the learning level of the nursing staff (Association for Professionals in Infection Control and Epidemiology [APIC], 2019). An outline of the presentation can be found in Appendix C. The training session also included a return demonstration of appropriate hand hygiene by each nursing staff member before leaving the session. A handout that summarized the information shared at the session was given to each nursing staff member after the session was completed so they could review what they learned. Four training sessions were provided, with 5-12 nursing staff members per session. Reminder signs for proper hand-hygiene and ways to reduce HAIs were placed throughout the facility.

### **Conceptual Framework**

When assessing the different conceptual framework models, the Iowa Model created by Marita Titler and colleagues, found in Appendix D, was the most effective model for this DNP project (Titler et al., 2001). The first step of the model, identify triggering issues and opportunities, outlines the need for IPC and is described in the background section of this paper. The next step of the Iowa Model is to form a team, which consisted of the Director of Nursing, Executive Director at Hawaii Kai Assisted Living, a nursing staff education content expert, and faculty members. The following step of the model is to appraise and synthesize the body of evidence, which was reviewed in the Literature Synthesis. The design and pilot of the practice change step of the model is described in the methods and procedure section.

## **PICO Question**

For the nursing staff caring for the elderly at Hawaii Kai Assisted Living facility, does increasing the number of hand hygiene stations and implementing an infection prevention and control (IPC) training program compared to using current hand hygiene practices, affect nursing staff's IPC knowledge and hand hygiene practices in the facility within 2 months?

## **Methods and Procedures**

### **Purpose Statement and Project Objectives**

The purpose of this evidence-based quality improvement project was to implement an infection prevention and control (IPC) program at Hawaii Kai Assisted Living (HKAL) facility to improve the nursing staff's current knowledge and practices regarding IPC. The objectives included: (a) 80% of the nursing staff at HKAL would participate in the IPC training program, which consisted of a proper hand hygiene demonstration and an IPC presentation; (b) 100% of nursing staff who participated in training program would be able to demonstrate proper hand hygiene after training session; (c) Before the training started, there would be 10 hand-hygiene stations installed throughout the facility to double the amount they initially had; (d) Immediately after the training session, there would be an increase in the nursing staff's aggregate IPC post-test score compared to their aggregate pre-test score; (e) After two months post-training, the average of the nursing staff's post-test scores would be the same or improved compared to their average pre-test score before training and average post-test score immediately after training to show knowledge retention; (f) After two months post-training, 75% of the nursing staff would self-report practicing proper hand hygiene; (g) After three months post-training, the AL portion of the facility would have at least partial compliance in practicing proper hand hygiene measured by a portion of the IPCP evaluation tool.

## **Project Plan**

**Setting.** The project took place at Hawaii Kai Assisted Living (HKAL) facility, which has a nursing staff of 15 charge nurses, and 25 resident assistants who function as nurse aides. HKAL cares for the Assisted Living (AL) residents who need help with their ADLs and medication administration but are not at the level of acuity suited to live at a skilled nursing facility (SNF). There are currently 70 residents who live at HKAL. This population is 70 years of age or older, relatively diverse, has multiple chronic diseases, and has impaired mobility or mental status. HKAL is part of a larger campus that is known as Hawaii Kai Retirement Community and consists of two main buildings where AL residents and independent residents live, as well as separate studios exclusively for independent residents scattered throughout the property. The 70 AL residents live in both main buildings, where there are two charge nurses, and four RAs staffed in the day and one charge nurse and two RAs at night per building.

**Participants.** Participants in this project were the nursing staff at HKAL which included nurses and RAs who have direct contact with the AL residents and who work either full or part-time. Including this staff was feasible for this site because there was a relatively small number of staff and for proper IPC the entire nursing staff needs to work collectively to decrease HAIs in the facility.

## **Procedures**

**Human subject consideration.** The author has completed the Collaborative Institutional Training Initiative (CITI) Training for research ethics and compliance, and Health Insurance Portability and Accountability Act (HIPAA) Training on patient privacy protections. This DNP project involves making judgments about a problem to improve or further develop program

## INFECTION CONTROL IN THE LONG-TERM CARE SETTING

effectiveness and inform decisions about future programming within an organization (University of Hawaii Human Studies program, personal communication, August 2, 2018). All these tasks are related to quality improvement and will not produce generalizable knowledge. This project will not require IRB application and review.

**Measurements.** To measure if there were double the number of HHS throughout the facility before the training session, the DNP student counted the number of HHS throughout the facility before and after installation. To measure whether there was an increase in IPC knowledge among the nursing staff after the IPC training program, a pre/post-assessment tool was used (Appendix E). The same assessment was administered 2 months after the training to assess knowledge retention. This assessment was created by the DNP student and the questions are focused on the content that was covered in the IPC training program, specifically hand hygiene. To assess whether there was an improvement in hand hygiene practices among the nursing staff, a portion of the IPC program evaluation (IPCPE) tool, created by Zimmerman, Yeatman, Jones, and Murdoch (2013), was used. Due to the robust nature of the tool, and the simplicity of the IPC program that was implemented at HKAL, only the sections found in Appendix F were used to evaluate hand hygiene practice change. The observational tool was used by the DNP student over a two-week span to observe the facility's compliance to proper hand hygiene practices. The authors of the tool gave permission for the use of the tool as seen in the email in Appendix G.

**Data collection procedures.** By September 31, 2019, there were twice the number of HHS found throughout the Assisted Living (AL) portion of the facility. By October 15, 2019 the IPC pre-test, in paper format, was administered by the facility's DON and ED before the training session and they ensured that the nursing staff did not use any outside resources so that baseline

## INFECTION CONTROL IN THE LONG-TERM CARE SETTING

data was gained regarding IPC knowledge. By October 15, 2019, the nursing staff attended at least one of the five IPC educational/training sessions. By October 15, 2019, the nursing staff who attended a session completed the IPC post-test, which was administered the same way as the pre-test. By December 15, 2019, the nursing staff completed the IPC post-test to evaluate if IPC knowledge is maintained over a period of time. By January 1, 2019, the DNP student used the IPCPE tool to assess compliance to IPC intervention strategies after implementation of the IPC program.

**Data analysis.** The DNP student compared the number of HHS after implementation to the number of HHS before implementation to determine if there was a twofold increase. The nursing staff's aggregate pre-test score were calculated by adding up all of the scores and then dividing it by the number of staff who took the test. The same calculation was completed for the post-test scores, and the post-test average was compared to the pre-test average. For the IPCPE tool, the total number of yes answers were added together and then divided by the total number of questions answered (including all yes and no answers) excluding the non-applicable. Then, that number was multiplied by 100 to get the percentage, with 85% or greater indicating compliance; 76-84% indicating partial compliance; and 75% or below indicating minimal compliance (Zimmerman et al., 2013).

### Results

#### Number of HHS

Before implementation there were 10 total hand-hygiene stations, after implementation there were a total of 23 hand-hygiene stations. There was greater than two times increase. The 13 hand sanitizer stations were divided between the two buildings. Stations were portable and could be moved throughout the assisted living portion of the facility.

## INFECTION CONTROL IN THE LONG-TERM CARE SETTING

### **IPC Knowledge**

The aggregate pre-test scores before the IPC training program was 73.9%. Immediately after the training program, the aggregate post-test score was 86%. Two months after the training session, the aggregate post-test score was 84.1%. Distribution of the scores is depicted in the bar graph found in Appendix H. It is noted that only 62% of the nursing staff answered the question about hand-sanitizer's effectiveness towards all germs correctly for the second post-test. Thirty-three out of 41 or 82% of the nursing staff attended a training session and took a pre/post-test. Of the nursing staff who attended a meeting, 100% were able to perform proper hand-hygiene immediately after training.

### **IPC Practices**

Using the IPCPE tool, 30 questions applied, with a total of 23 yes and 7 no responses. This equated to a 76.7%, which indicated partial compliance to hand hygiene, a major component in interventions to improve IPC. After 2 months, 85.2% of the nursing staff self-reported that they practice proper hand-hygiene, with 14.8% self-reporting that they can still improve their IPC practices.

### **Discussion**

The results of this evidence-based practice study reflect what was found in the literature, that IPC training programs can help to increase nursing staff knowledge related to IPC. The results of the study met all of the objectives, including a greater than 80% participation, an increase in scores after the training session, and continued increase in IPC test scores after two months compared to pre-training scores. It is noted that two months after the training, the aggregate score of the nursing staff was still above the pre-test scores and there was just a 2% decrease from the initial post-test aggregate score, which indicates the nursing staff retained a

## INFECTION CONTROL IN THE LONG-TERM CARE SETTING

majority of what they learned regarding IPC. Participation was adequate throughout the process, with the objective of 80% of the nursing staff to attend a training session being met. Also, after three months of the IPC program being implemented, the facility achieved partial compliance to hand-hygiene practices. The results support how an IPC training program can lead to an increase in knowledge and support practice change.

As noted in the results section, only 62% of the nursing staff were able to correctly answer the question regarding hand-sanitizer effectiveness towards all bacteria. This information was passed on to the DON so that future education sessions can stress how hand-sanitizer is not a substitute for washing hands. For the IPCPE tool, the questions that were answered “No” were shared with the DON to best improve compliance to hand-hygiene practices. Hand-hygiene practices were observed by the DNP student using the hand-hygiene portion of the IPCPE tool. The DNP student works at the facility which has both its benefits and limitations. A potential benefit was that because the DNP student works at the facility, she did not alarm staff and cause them to behave in ways that they would if they knew they were being evaluated by an inspector or outside observer. The nursing staff knowing the DNP student could have also led to an increase in participation.

### **Limitations**

A possible limitation is the potential bias associated with the DNP student being the person who evaluated the facility’s compliance to proper hand-hygiene. There was also a change in management at the facility while the project was being implemented that set the timetable back a month. When the program started until its final evaluation, there was staff turnover that should be noted, new staff members that were hired did not have the opportunity to attend the IPC training but were still included in the final evaluation process. Staff also were not consulted

## INFECTION CONTROL IN THE LONG-TERM CARE SETTING

regrading where the new hand-hygiene stations were located. Since the stations are mobile, they can be asked in the future where each station should be placed to be the most effective.

More accurate evaluation methods regarding practice change were not plausible at this facility. For example, soap and hand sanitizer use were unable to be monitored because the facility gets stocked all together, so there was no way to differentiate use in the AL portion of the facility with the rest of the property. Use at one station that is used frequently by the nursing staff was also not possible because the nursing staff uses multiple stations and residents also have access to those stations, which would hinder monitoring nursing staff use exclusively. Evaluating for a change in the number of HAIs was also not possible because the facility does not keep track of the number of HAIs that are contracted.

### **Recommendations and Future Study**

Future recommendations regarding implementation of an IPC program in the long-term care setting can be broken down into levels, as seen in Appendix I. Expanding the training to include proper use of personal protective equipment, and isolation precautions could further improve IPC practices at the facility. The education material used in the training session will be turned into a recorded voice over presentation so that future staff can complete the training upon being hired, as well as using the presentation to refresh current staff member's IPC knowledge. To promote knowledge retention and best practices, the nursing staff will be made aware that they will be evaluated using the IPCPE tool every two months to assess their IPC practices. In doing so, this will promote the nursing staff to refresh their knowledge regarding IPC to be ready for the evaluation. The DON agreed to continue to work on this project with the assistance of the DNP student and is open for future DNP students to continue the project and conduct future studies.

## INFECTION CONTROL IN THE LONG-TERM CARE SETTING

As the robustness of the program expands, further portions of the IPCPE tool can be used to evaluate further practice change. A reporting system regarding HAIs could also be used to improve how HAIs are monitored, such as a HAI log that is reviewed on a monthly basis. Improved monitoring of HAIs would allow future studies to be able to see the effect EBP supported interventions have on HAI levels, allowing to assess for long-term change. Quantitative evaluation methods can be used in the future, including culturing nursing staff members hands after they are done completing hand-hygiene to measure effectiveness. Glo Germ gel can also be used as a quantitative method to evaluate the accuracy in hand hygiene technique.

### **Conclusion**

IPC practices and interventions are essential in every healthcare setting and are becoming crucial with recent outbreaks such as measles, Ebola, and the current COVID-19 pandemic. As is often found in the health care setting, human resources are limited and will likely remain a barrier to IPC practice change for the foreseeable future. Collaboration with administration and their subsequent support is needed to accrue available resources needed to implement IPC training. The literature and the results of this project support IPC training as an effective intervention to improve IPC practices. Future studies need to be done to gain more data specific to the long-term care setting due to a majority of research being conducted in the acute care setting. HKAL will continue to expand their IPC program and make efforts to both sustain and improve IPC practices, with the help of the DON and staff. IPC is an area in many facilities that can be improved upon and by implementing IPC interventions that are supported by the literature, a positive change can be made.

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Stone, P. W. (2015). Perceived barriers to infection prevention and control for nursing home certified nursing assistants: A qualitative study. *Geriatric Nursing*, 36(5), 355-360.

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Uchida, M., Pogorzelska-Maziarz, M., Smith, P. W., & Larson, E. (2013). Infection prevention

in long-term care: A systematic review of randomized and nonrandomized trials. *Journal of the American Geriatrics Society*, 61(4), 602-614. doi:10.1111/jgs.12175

# INFECTION CONTROL IN THE LONG-TERM CARE SETTING

## Appendix A

### Mosby's Level of Evidence Ranking Tool

Mosby's Level of Evidence Ranking Tool	
Level	Type of Study
I	Systematic review or meta-analysis
II	RCTs
III	Non-randomized controlled trials
IV	Well-designed case-control or cohort studies
V	Systematic reviews of descriptive and qualitative studies
VI	Single descriptive or qualitative study
VII	Opinion of authorities and/or other reports of expert committees

(Ackley, Swan, Ladwig, & Tucker, 2008)

## Appendix B

### Literature Review Matrix

Year of Publication	Author(s)	APA Citation	Aim/Purpose	Data Collection	Findings	Study Type/Level of Evidence	Limitations	Conclusion	Topics related the overall topic and purpose of the review
2000	Alexis T. Makris, Louise Morgan, Donna J. Garber, Alan Richter, and Joseph Rubino	Makris, A. T., Morgan, L., Gaber, D. J., Richter, A., & Rubino, J. R. (2000). Effect of a comprehensive infection control program on the incidence of infections in long-term care facilities. <i>American Journal of Infection Control</i> , 28(1), 3-7. doi:10.1016/s0196-6553(00)90004-x	Design and implement an infection control program in the long-term care setting and assess its effects on incidence of infection	The 8 facilities were selected on the basis of similarity with respect to admission rate, size, acuity levels, availability of services, overall infection rates, and in-house environmental service departments. Facilities used the same data collection work sheet. It identified patient demographic information, criterion for infection, invasive devices, causative pathogen, antibiotic therapy, and body site of infection.	In the intervention year, the test homes reported 621 infections, a decrease of 122 infections (incidence density rate, 4.15); in the control homes, the number of infections increased slightly, to 626 (incidence density rate, 3.15). The greatest reduction in infections in the test homes was in upper respiratory infections.	Randomized controlled trial/ Level 2	Relatively small sample size, which made the significance of the results possibly skewed.	A comprehensive infection control program that includes handwashing and environmental cleaning and disinfecting may help reduce infections among the elderly residing in long-term care settings.	This article is relevant and significant to the topic at focus because it is focused on the topic outcome, which is reducing the incidence of infection.
2006	Brenda J. Roup, Jeffrey C. Roche, and Margaret Pass	Roup, B. J., Roche, J. C., & Pass, M. (2006). Infection control program disparities between acute and long-term care facilities in Maryland. <i>American Journal of Infection Control</i> , 34(3), 122-127. doi:10.1016/j.ajic.2005.12.010	Distinguishing the disparities between the acute and long-term care settings in Maryland	A self-administered questionnaire was sent to all 40 ACHs, 247 LTCFs, and 20 specialty hospitals in the state. The senior infection control professional (ICP) in the facility completed the questionnaire.	Infection control professionals were much more prevalent in acute care settings compared to LTC settings as well as ninety percent of acute care ICPs receiving basic infection control training compared to a mere 3% of LTC ICPs	Cross-sectional study/ Level 4	Results were from a self-reported survey, which can lead to bias and decrease in reliability	Major differences in ACHs and LTCFs in the ratio of ICP FTEs to beds and in basic infection control educational preparation for ICPs. LTCFs could benefit from basic infection control training and from regulatory actions addressing staff-to-resident ratios.	This study is significant because it shows the need of increased ICPs and infection control training in the LTC setting.
2011	Brenda J. Roup and Joseph M. Scaletta	Roup, B. J., & Scaletta, J. M. (2011). How Maryland increased infection prevention and control activity in long-term care facilities, 2003-2008. <i>American Journal of Infection Control</i> , 39(4), 292-295. doi:10.1016/j.ajic.2010.09.004	Determining if LTC facilities in Maryland could benefit from training and regulatory upgrades related to infection prevention and control (IPC).	From 2003-2008, the Department of Health and Mental Hygiene (DHMH) partnered with long-term care industry trade associations and implemented regulatory, educational, and financial initiatives to improve this situation. In January 2008, all LTC facilities in the state were resurveyed.	44% of LTC facilities used a trained IP to manage the IPC program, 5 times the amount compared to 2003. LTC facilities with a trained IP recognized and reported outbreaks to the local health department 2 days sooner than facilities without a trained IP, resulting in fewer cases of disease.	Cohort study/ Level 4	Small sample size and restriction of sample selection	Multiple initiatives with concerned stakeholders and LTC partners over the course of 5 years resulted in increased numbers of LTC facilities with trained IPs who recognized and responded to outbreaks sooner than facilities without trained IPs.	These findings are relevant to the topic of the DNP project because it shows the outcomes of having an IP at long-term care facilities, indicating the need for this project if the same deficits can be seen.

# INFECTION CONTROL IN THE LONG-TERM CARE SETTING

2012	Kathleen Chami, Gaëtan Gavazzi, Avner Bar-Hen, Fabrice Carrat, Benoit de Wazières, Benoist Lejeune, Nathalie Armand, Muriel Rainfray, Joseph Hajjar, François Piette, and Monique Rothan Tondeur	Chami, K., Gavazzi, G., Bar-Hen, A., Carrat, F., Wazières, B. D., Lejeune, B., . . . Tondeur, M. R. (2012). A Short-Term, Multicomponent Infection Control Program in Nursing Homes: A Cluster Randomized Controlled Trial. <i>Journal of the American Medical Directors Association, 13</i> (6). doi:10.1016/j.jamda.2012.04.008	To assess the impact of a hygiene-encouragement program on reducing infection rates in nursing homes (NHs) across France.	Fifty nursing homes (NHs) with 4345 beds in France were randomly assigned by stratified-block randomization to either a multicomponent intervention (25 NHs) or an assessment only (25 NHs). National surveys were used to collect baseline data. All data collection was done through a web based questionnaire.	The incidence rate of the first episode of infection was 2.11 per 1000 resident-days in the interventional group and 2.15 per 1000 resident-days in the control group, no statistical significance.	Cluster randomized controlled trial/ Level 2	The compliance survey's were self-perceived, which decreases the validity and increases internal bias. The studies objectives led to results that were hard to interpret. There are many variables that are different between NHs that cannot be accounted for that could have led to altered results.	The authors concluded that the results of this type of intervention are hard to interpret and more studies need to be done to strengthen the evidence in this particular field. A qualitative approach (behavioral change) needs to be taken into account, not just qualitative (infection rates).	This article is relevant because the interventions that constitute the IPC program are similar to the ones I hope to include in my IPC program. The problems that the authors faced can also be used to forecast possible issues and avoid the same problems that led to their dismal results.
2012	Steven J. Schwoon, Sarah L. Edmonds, Jane Kirk, Douglas Y. Rowland, and Carmen Acosta	Schwoon, S., Edmonds, S., Kirk, J. M., & Rowland, D. Y. (2012). Effectiveness of a Comprehensive Hand Hygiene Program for Reduction of Infection Rates in a Long-Term Care Facility: Lessons Learned. <i>American Journal of Infection Control, 40</i> (5). doi:10.1016/j.ajic.2012.04.265+D6	Evaluate the effectiveness of a comprehensive hand hygiene program for reduction of infection rates in a long-term care facility.	LRTIs and SSTIs were identified and classified according to the McGeer et al. definitions for surveillance in LTCFs. Definitions for influenza-like illness, pneumonia, and other LRTIs, such as bronchiitis and tracheobronchitis, were used. Definitions for SSTIs included cellulitis, soft tissue, and wound infection	A significant reduction in upper respiratory tract infections post-intervention. There was also a decrease in soft-tissue infections, although the results may not be statistically significant	Non-randomized trial/ Level 3	The sample was non-randomized, increasing the risk of bias.	Use of alcohol-based hand rubs, as part of a comprehensive hand hygiene program for HCP and residents, can decrease infection rates in LTCFs.	This study is significant because it showed that the use of alcohol-based hand rubs as part of a comprehensive hand hygiene program can decrease infection rates in the LTC setting, which can be included in the potential infection control program that will be implemented for the project
2013	Kaitlin Rainwater-Lovett, Kevin Chun, Justin Lessler	Rainwater-Lovett, K., Chun, K., & Lessler, J. (2013). Influenza outbreak control practices and the effectiveness of interventions in long-term care facilities: A systematic review. <i>Influenza and Other Respiratory Viruses, 8</i> (1), 74-82. doi:10.1111/irv.12203	To characterize influenza case and outbreak definitions and control measures reported by long-term care facilities (LTCFs) of elderly adults and estimate the reduction in influenza-like illness (ILI) attack rates due to chemoprophylaxis and NPI.	Literature search conducted during September 2011 in the PubMed database using the following search phrase: (influenza) AND ('long-term care' OR 'long-term care' OR 'assisted living' OR 'nursing home' OR 'nursing homes')	14 articles were included, the results showed that anti-viral prophylaxis significantly decreased the rates of influenza attacks and reduces the chance of LTCF residents developing the flu. Protective effects of NPI such as droplet precautions, PPE, and hand hygiene, but influenza virus transmission was not specifically assessed.	Systematic review/ Level 1	Reporting biases are important to consider as many observational studies were incorporated into this analysis.	Pharmaceutical control measures have the clearest reported protective effect in LTCFs. Non-pharmaceutical approaches may be useful; however, most data were from observational studies and standardized reporting or well-conducted clinical trials of NPI are needed to more precisely measure these effects	Interventions included in this study can be incorporated in the infection control policy/program that will be implemented for the DNP project.
2013	Mayuko Uchida, Monika Pogorzelska-Maziarz, Philip W. Smith, and Elaine Larson	Uchida, M., Pogorzelska-Maziarz, M., Smith, P. W., & Larson, E. (2013). Infection Prevention in Long-Term Care: A Systematic Review of Randomized and Nonrandomized Trials. <i>Journal of the American Geriatrics Society, 61</i> (4), 602-614. doi:10.1111/jgs.12175	Review and synthesize current evidence and the methodological quality of non-pharmacologic infection prevention interventions in long-term care (LTC) facilities for older adults.	Two reviewers systematically searched 3 electronic databases: Medline, PubMed, and Cochrane Controlled Trials Register.	Majority of studies included were RTCs where the primary interest was to reduce respiratory infections, with interventions being therapy based. Oral hygiene was a common intervention to reduce pneumonia.	Systematic review/ Level 1	Included only published papers, possible publication bias may exist. Selection criteria had a narrow focus, this may have resulted in exclusion of some effective interventions. Exclusion of outbreak reports may have led to missing interventions developed during these types of events.	Significant gaps exist in the quality of interventions currently reported. Clearly defined outcome measures and standardized reporting of findings are needed regarding infection prevention in the LTC setting.	This study is relevant because it reviews all interventions that have been used in the literature regarding infection preventions in LTC setting. This information can be used when formulating the program that will be implemented for the DNP project.

# INFECTION CONTROL IN THE LONG-TERM CARE SETTING

2014	Rachel A. Kossover, Carolyn J. Chi, Matthew E. Wise, Alvin H. Tran, Neha D. Chande, and Joseph F. Perz	Kossover, R. A., Chi, C. J., Wise, M. E., Tran, A. H., Chande, N. D., & Perz, J. F. (2014). Infection Prevention and Control Standards in Assisted Living Facilities: Are Residents Needs Being Met? <i>Journal of the American Medical Directors Association</i> , 15(1), 47-53. doi:10.1016/j.jamda.2013.09.011	Describe current state laws surrounding ALF admissions criteria and restrictions related to ALF medical conditions of the resident, the types of personnel who can provide assistance with medical care and administer medication in ALFs, standards for infection control training and education for ALF staff, and vaccination requirements for residents and staff.	A structured abstraction tool to collect data was developed, and relevant data was collected from all 50 states.	54% of all 50 states specify requirements for some form of initial infection control training for all staff; 50% require reporting of disease outbreaks to the health department; 18% specify requirements to offer or require vaccines to staff; 30% specify requirements to offer or require vaccines to residents.	Cross-sectional study/ Level 4	Study was unable to describe how frequently facilities either failed to meet or exceeded the requirements prescribed by state regulations. In addition, many states have unlicensed ALFs that are not subject to regulation by the state because of their small size or other facility characteristics.	Wide variation in how assisted living facilities are regulated in the United States. Regulatory changes may be needed to ensure safe health care delivery, and minimize risks of infections, outbreaks of disease, and other forms of harm among assisted living residents.	This study is relevant because it provides data from all 50 states, making it a comprehensive snapshot of what is being practiced at ALFs nationwide. Their findings support the need of an infection control policy and ALFs to regulate practices and reporting.
2015	Carolyn T. A. Herzig, Patricia W. Stone, Nicholas Castle, Monika Pogorzelska-Maziarz, Elaine L. Larson, and Andrew W. Dick	Herzig, C., Castle, N., Pogorzelska-Maziarz, M., Engberg, J., Larson, E. L., & Stone, P. W. (2015). Infection Prevention and Control Programs in Nursing Homes: Results from a National Survey. <i>American Journal of Infection Control</i> , 43(6). doi:10.1016/j.ajic.2015.04.072	The study was aimed at gaining a national perspective of the current state of nursing home infection prevention and control (IPC) programs. It also examined the differences in characteristics of IPC programs for NHs that had and had not received an infection control deficiency citation.	34-item survey that consisted mostly of closed-ended questions, developed by adapting and modifying a survey used to evaluate IPC programs in acute care settings. Survey responses were linked with concurrent Certification and Survey Provider Enhanced Reporting (CASPER). Descriptive statistics were computed using $\chi^2$ , Fisher's exact, t or Wilcoxon-Mann-Whitney tests.	The person who was in charge of the IPC program at their respective NHs often had additional responsibilities and limited training regarding IPC. NHs that received citations had infection control professionals with less experience and training and had limited resources allocated for continuing education in infection control.	Cross-sectional study/ Level 4	Limitations included low response rates and decreased generalizability of results.	Development of specific and evidence-based guidelines is needed.	This article is significant because it focuses on a problem that could be addressed with the infection control program that will be implemented for the DNP project.
2015	Kingston, O'Connell, and Dunne	Kingston, L., O'Connell, N., & Dunne, C. (2016). Hand hygiene-related clinical trials reported since 2010: A systematic review. <i>Journal of Hospital Infection</i> , 92(4), 309-320. doi:10.1016/j.jhin.2015.11.012	Purposet of the study was to update the collation of literature regarding the effectiveness of hand-hygiene programs, focusing on methodological designed clinical trials.	Systematic review using PubMed and CINAHL. Articles that were included were epirical studies that reported on hand hygiene compliance. Result wsa 16 studies.	Overall compliance rates improved as a result of the interventions, with some studies showing greater and more sustained improvements than others.	Systematic review/ Level 1	The studies had different forms of evaluating hand-hygiene compliance, and different interventions.	Adopting a multimodal approach to hand hygiene improvement intervention strategies, has been shown to achieve slight to moderate improvements in hand hygiene compliance.	Relevant to the project, supports implmenting a hand-hygiene program to increase compliance.
2015	Hannah P. Sassi, Laura Y. Sifuentes, David W. Koenig, Emmalee Nichols, Jocelyn Clark-Greuel, Lung Fai Wong, Kevin McGrath, Charles P. Gerba, and Kelly A. Reynolds	Sassi, H. P., Sifuentes, L. Y., Koenig, D. W., Nichols, E., Clark-Greuel, J., Wong, L. F., . . . Reynolds, K. A. (2015). Control of the spread of viruses in a long-term care facility using hygiene protocols. <i>American Journal of Infection Control</i> , 43(7), 702-706. doi:10.1016/j.ajic.2015.03.012	Test the effectiveness of hygiene protocols such as hand sanitizers, hand and face wipes, antiviral tissues, and a disinfectant spray on virus transmission at a long-term care facility.	The coliphage MS-2 was seeded onto a staff member's hands, and samples were collected after 4 hours from fomites and hands. After 3 consecutive days of sample collection, a 14-day hygiene intervention was implemented. Hand sanitizers, hand and face wipes, antiviral tissues, and a disinfectant spray were distributed to employees and residents. Seeding and sampling were repeated postintervention.	Hygiene protocols that were implemented decreased virus transmission, which provides supportive data to include hygiene interventions in the infection control program that will be implemented for the DNP project.	Non-randomized trial/ Level 3	This study was implemented in a single, small facility, which means the results may not be seen if the intervention was implemented in other facilities	Although MS-2 spread readily from hands to fomites and vice versa, the intervention reduced average MS-2 concentrations recovered from hands and fomites by up to 4 logs and also reduced the incidence of MS-2 recovery.	This study focuses on the actual transmission of viruses versus other studies whose outcomes are only related to infection transmission, such as incidence of infection.

# INFECTION CONTROL IN THE LONG-TERM CARE SETTING

2015	Jasmine Travers, Carolyn T.A. Herzig, Monika Pogorzelska-Maziarz, Eileen Carter, Catherine C. Cohen, Patricia K. Semeraro, Ragnhildur I. Bjarnadottir, and Patricia W. Stone	Travers, J., Herzig, C. T., Pogorzelska-Maziarz, M., Carter, E., Cohen, C. C., Semeraro, P. K., . . . Stone, P. W. (2015). Perceived barriers to infection prevention and control for nursing home certified nursing assistants: A qualitative study. <i>Geriatric Nursing</i> , 36(5), 355-360. doi:10.1016/j.gerinurse.2015.05.001	Identify perceived barriers to infection prevention and control for nursing home certified nursing assistants (CNA).	May-September 2013, we enrolled facilities and conducted site visits at 10 NHs located across the country (Northeast: n=3; South: n=4; West/Midwest: n= 3). Medical staff were interviewed and recorded. Questions were open-ended and focused on infection prevention.	Themes that were included as potential barriers included language/culture, knowledge/training, part-time staff, workload, and accountability.	Qualitative study/ Level 6	This study has a low level of evidence, due to the results coming from personal opinions and perceptions from nursing staff. Limitations to this study included language barriers that could have led to miscommunication and the fact that it was a secondary data analysis.	Necessary to implement strategies designed to improve CNA work performance and overcome IPC barriers, while taking into account the high diversity of the CNA workforce.	This article is important because it is problem focused and shows potential barriers that needs to be addressed for this project. A large portion of patient interaction in this setting is by nurse aides, which is why the topic of this study is so prevalent to the topic of the project.
2016	Koo, McNamara, Lansing, Olmsted, Rye, Fitzgerald, and Mody	Koo, E., Menamara, S., Lansing, B., Olmsted, R. N., Rye, R. A., Fitzgerald, T., & Mody, L. (2016). Making infection prevention education interactive can enhance knowledge and improve outcomes: Results from the Targeted Infection Prevention (TIP) Study. <i>American Journal of Infection Control</i> , 44(11), 1241-1246. doi:10.1016/j.ajic.2016.03.016	Assess effectiveness of an interactive educational program in increasing knowledge of key infection prevention and control (IPC) principles among nursing home healthcare personnel.	Pre- and Post-tests were administered to the intervention NHs. Only pre-tests were administered to the NH that received no intervention.	Score improvement was highest for modules emphasizing hand hygiene, urinary catheter care and MDROs (15.6%, 15.95%, and 22.0%, respectively). After adjusting for cluster study design, knowledge scores were significantly higher after each educational module.	Randomized controlled trial/ Level 2	The study compared the baseline knowledge between control and intervention site HCP to establish baseline comparisons. Could not demonstrate individual HCP knowledge improvement, due to high turnover rate. Only one area of implementation decreases generalizability.	Knowledge scores were significantly higher after each educational module.	This article supports implementing an IPC program to improve IPC knowledge amongst health care workers.
2016	Barbara W. Trautner, M. Todd Greene, Sarah L. Krein, Heidi L. Wald, Sanjay Saint, Andrew J. Rolle, Sara McNamara, Barbara S. Edson, and Lona Mody	Trautner, B. W., Greene, M. T., Krein, S. L., Wald, H. L., Saint, S., Rolle, A. J., . . . Mody, L. (2016). Infection Prevention and Antimicrobial Stewardship Knowledge for Selected Infections Among Nursing Home Personnel. <i>Infection Control &amp; Hospital Epidemiology</i> , 38(01), 83-88. doi:10.1017/ice.2016.228	Assessing knowledge about infection prevention among nursing home personnel and to identify potential deficits that can be addressed through a quality improvement collaborative	"AHRQ Safety Program in Long-Term Care: Healthcare-Associated Infections:CAUTI" was designed to increase CAUTI prevention in 5 cohorts. A knowledge assessment was administered at the start of each cohort. Data from cohort 1 and 2 were used for this study.	Although this study was largely focused on UTI detection and classifications, it was also found that there was a deficit in knowledge related to hand hygiene.	Cohort study/ Level 4	The sampling was not randomized and also the predominant focus of study was regarding UTIs	Important need to enhance infection prevention knowledge among healthcare personnel working in nursing homes to improve resident safety and quality of care.	The lack of knowledge regarding the correct disinfectant agent and technique are both problems that can be addressed through the infection control program that will be implemented for this project.
2017	Deborah Patterson Burdsall, Sue E. Gardner, Thomas Cox, Marin Schweizer, Kenneth R. Culp, Victoria M. Steelman, Loreen A. Herwaldt	Burdsall, D. P., Gardner, S. E., Cox, T., Schweizer, M., Culp, K. R., Steelman, V. M., & Herwaldt, L. A. (2017). Exploring inappropriate certified nursing assistant glove use in long-term care. <i>American Journal of Infection Control</i> , 45(9), 940-945. doi:10.1016/j.ajic.2017.02.017	Describe the degree of inappropriate glove use in a LTCF when HCP, including CNAs, help patients with toileting or while doing perineal care.	The glove use surveillance tool (GUST), was developed to measure inappropriate glove use. The GUST is a 6-category tool that allows trained observers to record the type of surface, the sequence in which a HCP touched surfaces during a patient care event, whether the HCP wore and/or changed gloves.	CNAs wore gloves for 80.2% of the touch points, failing to change gloves at 66.4% of glove change points. There was a significantly high level of contaminated touch points and missed opportunities to change gloves.	Cross-sectional study/ Level 4	Only shows the glove use of CNAs not all health care personnel. study was performed at a single LTCF, with low turnover of staff and consistently high levels of staffing compared with other LTCFs making the results hard to generalize. Participants knew the PI who performed the observations, possibly leading to bias	Inappropriate glove use by CNAs was frequently observed in this study. This could be the cause of contamination and the spread of pathogens.	This article is relevant because it shows a possible problem that can be addressed by implementing this DNP project.

## INFECTION CONTROL IN THE LONG-TERM CARE SETTING

2017	<p>Jasjit Kaur, Patricia W. Stone, Jasmine L. Travers, Catherine C. Cohen, Carolyn T.A. Herzig</p>	<p>Kaur, J., Stone, P. W., Travers, J. L., Cohen, C. C., &amp; Herzig, C. T. (2017). Influence of staff infection control training on infection-related quality measures in US nursing homes. <i>American Journal of Infection Control</i>, 45(9), 1035-1040. doi:10.1016/j.ajic.2017.04.285</p>	<p>Determine relationships between methods, frequency, and timing of staff IPC training and infection-related quality measures in a national sample of NHs</p>	<p>Survey of 2,514 randomly sampled US NHs was conducted between December 2013 and December 2014 to describe the current state of NH IPC programs.</p>	<p>Results indicated that a continuous training program was more effective than a single intervention in reducing health-care associated infections</p>	<p>Cross-sectional study/ Level 4</p>	<p>The data was taken from a self-reported national survey, which could lead to bias. This article also included pressure ulcers and UTI's, which are not specifically related to the project topic</p>	<p>Timing of staff IPC training at new employee orientation and when an outbreak occurred was associated with better urinary catheter use QM. Further research is needed to assess whether timing of training can reduce infections in NH.</p>	<p>This study is important because it provides data that supports implementing a program that offers continuous training to constantly remind staff to practice effective infection control measures</p>
2017	<p>Diana TF Lee, Doris Yu, Margaret Ip, and Jennifer YM Tang</p>	<p>Lee, D., Yu, D., Ip, M., &amp; Tang, J. Y. (2017). Evaluation on the implementation of respiratory protection measures in old age homes. <i>Clinical Interventions in Aging</i>, 12, 1429-1438. doi:10.2147/cia.s142522</p>	<p>Evaluate the implementation of respiratory protection measures among infection control officers (ICOs) and health care workers (HCWs) in the nursing home setting.</p>	<p>Two sets of questionnaires were developed to collect data about the implementation of the respiratory protection measures from the ICOs and HCWs.</p>	<p>There was a deficit in training opportunities regarding respiratory infection control. Basic resources such as paper towels/hand dryers and equipment disinfectants, were rated as most inadequate by HCWs. Proper hand hygiene was also an additional area of concern.</p>	<p>Cross-sectional study/ Level 4</p>	<p>Participants were briefed about the outcomes and design of study as well as possibly being biased to say they practice higher level of infection control because they are being watched/interviewed.</p>	<p>Addressing the unmet training needs and promoting hand hygiene practice are efforts suggested to further enhance the implementation of respiratory protection measures in older adults homes.</p>	<p>This study provides possible areas of improvement that can be addressed through implementing a comprehensive infection control policy/program.</p>

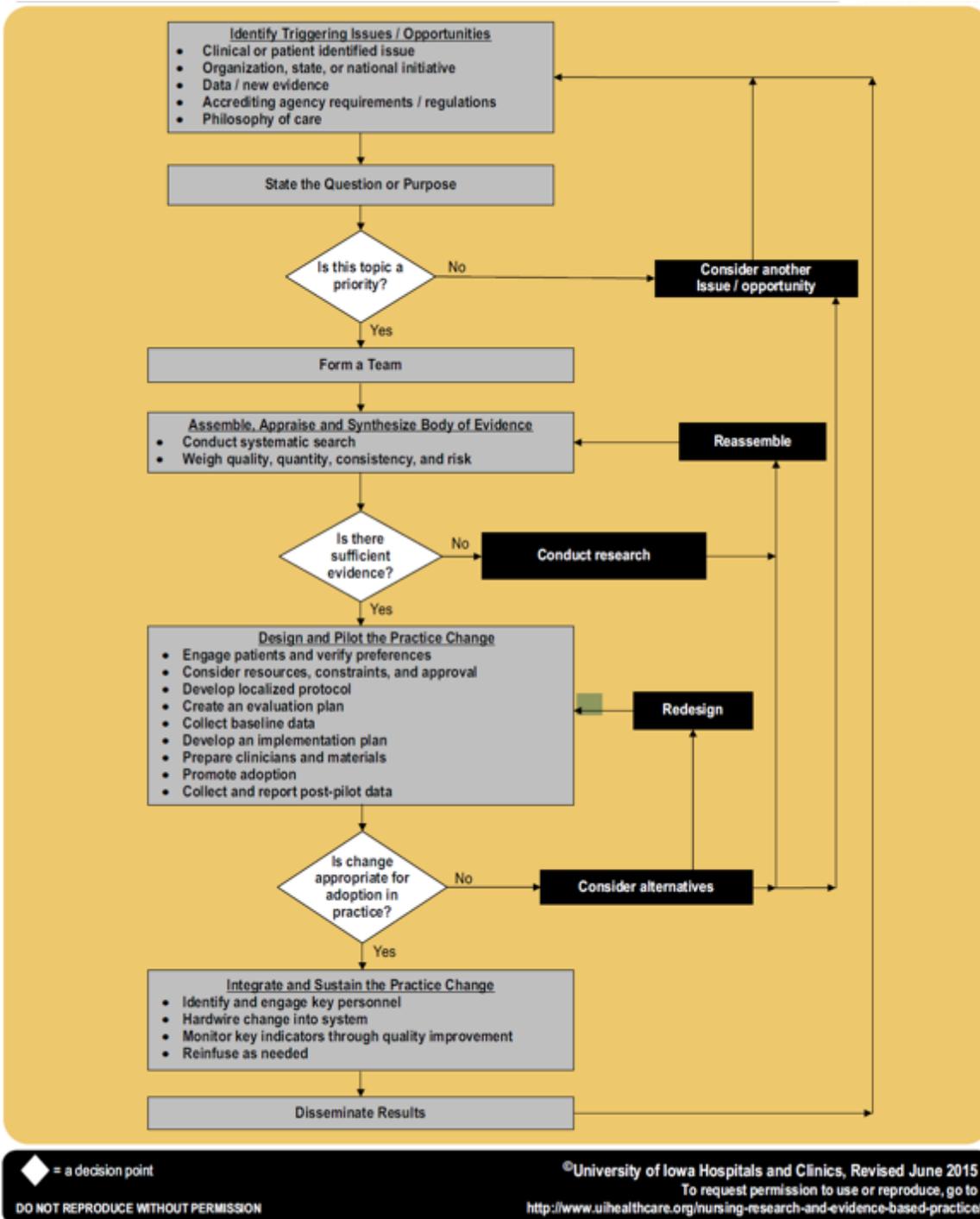
## Appendix C

### Outline of Content to be Included in the Training Session

- I. Infections
  - a. Explain what an infection is
  - b. Explain how infections occur
    - i. Germs, such as bacteria, viruses, molds and fungi can enter the body and cause an infection.
  - c. Chain of infection transmission
  - d. How germs spread
    - i. High touch surfaces
- II. Hand Hygiene
  - a. Proper hand hygiene
  - b. When to perform hand hygiene
  - c. Places where hand hygiene stations are available
  - d. Teach back method
- III. Cleaning and Disinfecting high touch surfaces
  - a. Using correct cleaning supplies
  - b. Checking labels of cleaning supplies
  - c. Knowing where cleaning supplies are located

Appendix D

Iowa Model



# INFECTION CONTROL IN THE LONG-TERM CARE SETTING

## Appendix E

### IPC Pre- and Post-Test Assessment Tool

1. Which of the following times will you have to wash your hands?
  - a. Before you touch a resident
  - b. After you touch a resident
  - c. After touching a resident's remote control
  - d. All of the above
2. How long should you wash your hands for?
  - a. 5 seconds
  - b. 10 seconds
  - c. 20 seconds
  - d. 45 seconds
3. How can you stop germs from moving?
  - a. Perform proper hand-hygiene
  - b. Clean high touch surfaces
  - c. Helping residents wash their hands
  - d. All of the above
4. What is the last step of washing hands?
  - a. Rinsing hands with water
  - b. Turn water off with paper towel used to dry off hands completely.
  - c. Lathering hands with soap
  - d. Turing water on
5. Which are examples of high touch surfaces, select all that apply, 1 point per correct answer).
  - a. Light switch
  - b. Floor
  - c. Door handle
  - d. Toilet seat and flush handle
6. True or False: Hand-sanitizer kills all germs.
  - a. True
  - b. False
7. Germs can live on surfaces for over a month
  - a. True
  - b. False
8. True or False: It is okay to use hand-sanitizer after using the restroom
  - a. True
  - b. False

Appendix F

Infection Prevention and Control Program Evaluation Tool

<b>4. Area: Intervention strategies</b>							
<b>4.1 Component: Interventions to improve IPC</b>							
<b>4.1.1 Standard: Hand hygiene will be performed correctly and in a timely manner using a cleansing agent, at the facilities available to reduce the risk of cross infection</b>							
		Yes	No	N/A	Verifier	Local initiative	Comments
1.	Liquid soap is available at all hand hygiene sinks						
2.	Liquid soap must be single-use cartridge dispensers						
3.	Dispenser nozzles are visibly clean						
4.	Absorbent single-use towels are available at all hand hygiene sinks						
5.	Wall mounted or pump dispenser hand cream is available for use						
6.	Antibacterial solutions/scrubs are not used for social hand hygiene						
7.	Antibacterial solutions are used for invasive procedures and surgical scrubs						
8.	There are no nail brushes on hand hygiene sinks in clinical areas						
9.	The hand hygiene sinks are free from used equipment and inappropriate items						
10.	Hand hygiene sinks are dedicated for that purpose						
11.	Access to hand hygiene sinks is clear						
12.	Hand hygiene sinks are clean and intact						
13.	Elbow operated taps are available in hand hygiene sinks in clinical areas						
14.	Alcohol hand rub (AHR) is available at entrance/exits to wards and departments						
15.	AHR is directly accessible at the point of care (one for every four beds)						
16.	AHR is portable for clinical procedures						

INFECTION CONTROL IN THE LONG-TERM CARE SETTING

	4.1.1 cont.	Yes	No	N/A	Verifier	Local initiative	Comments
17.	No wrist watches/stoned rings or other wrist jewellery are worn by staff carrying out patient care						
18.	Staff nails are short, clean, free from nail varnish or extensions						
19.	Posters promoting hand decontamination are available and displayed in areas visible to staff before and after patient contact						
20.	Staff have received training in hand hygiene procedure within the last year. (Ask various disciplines of staff)						
21.	Patients are offered hand hygiene facilities after using the toilet/commode/bedpan						
22.	Patients are offered hand hygiene facilities prior to meals						
<b>Observation</b>							
23.	Staff use the correct procedure for hand hygiene (observe practice)						
24.	Staff can indicate when it is appropriate to use alcohol rub						
25.	Hand hygiene is performed in the following circumstances: (Observe practices)						
A	Before touching a patient <sup>3</sup>						
B	Before clean/aseptic procedures <sup>3</sup>						
C	After body fluid exposure/risk <sup>3</sup>						
D	After touching a patient <sup>3</sup>						
E	After touching patient surroundings <sup>3</sup>						
F	Prior to handling food						
G	After leaving an isolation room						

## Appendix G

**Tate Kusatsu**

February 23, 2019 at 11:41 AM



IPCPE Tool

To: petanne.zimmerman@gmail.com

Dear Dr. Zimmerman,

My name is Tate Kusatsu and I am a DNP student at UH Manoa. I am currently working on implementing an infection prevention and control program at a long term care facility for my DNP project. While doing a literature search for evaluation tools regarding IPC in this setting, I found your article "Evaluating infection control: A review of implementation of an infection prevention and control program in a low-income country setting." The IPCPE tool you and your colleagues created intrigued me and I was wondering if there was any more information about the tool that was not in the article that you could provide me, as well as ask for permission to use your tool for the evaluation of my project. The work that you have done is amazing and I thank you for what you have contributed to the medical field and research. I look forward to hearing from you. Take care.

-Tate Kusatsu (BSN)

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**Peta-Anne Zimmerman**

February 25, 2019 at 1:03 PM



Re: IPCPE Tool

To: tatekusatsu@me.com

Dear Tate Kusatsu

Thank you for your email.

I now work at Griffith University and use this tool throughout the South Pacific, mainly with WHO consultancies. I am attaching a copy of this tool for your use. I am more than happy to discuss and assist where possible.

Kind regards

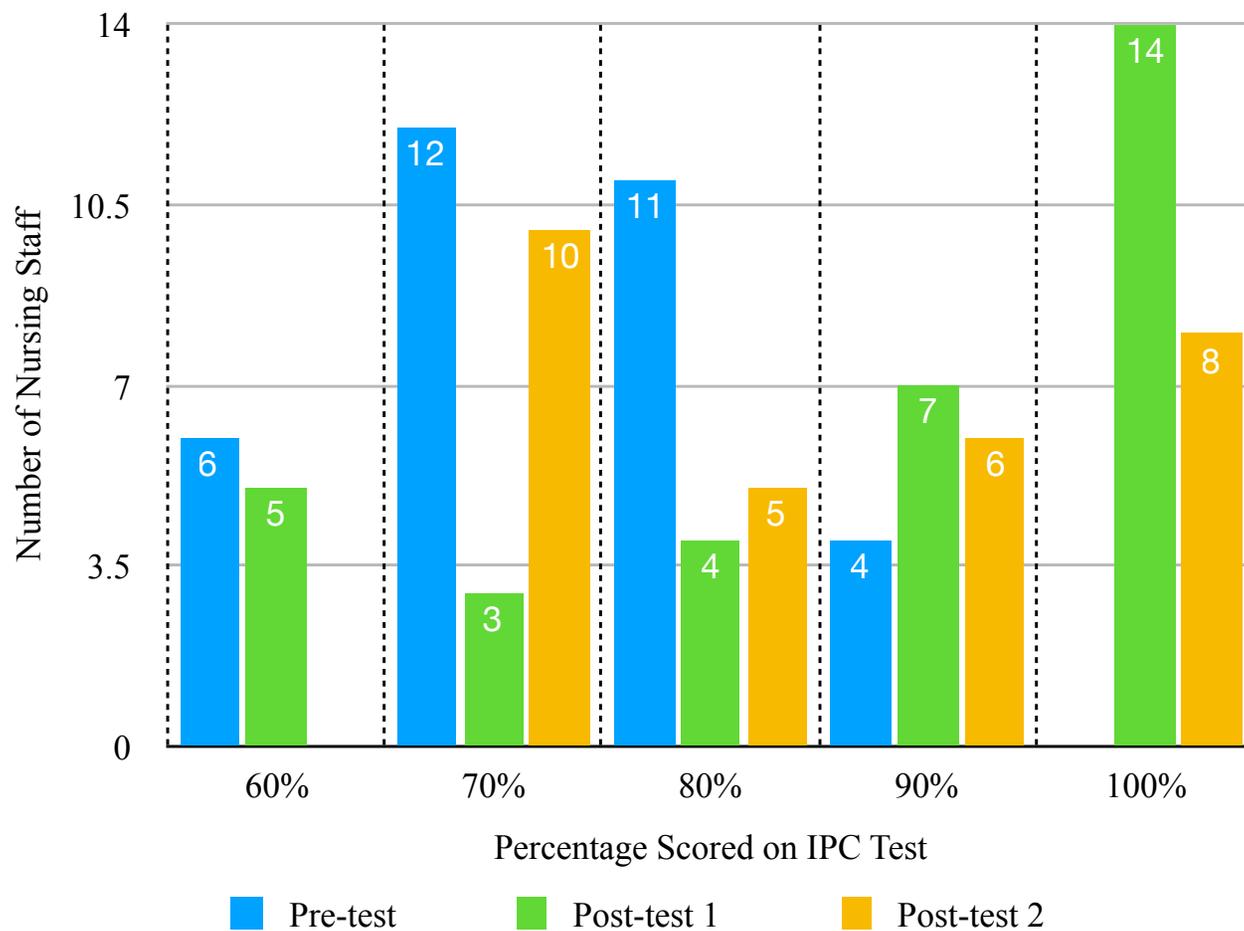
Peta-Anne

*I aspire to achieve a sensible work-life balance: I don't expect a reply to this email from you outside of your normal working hours. Similarly, please expect the same from me.*

Dr Peta-Anne Zimmerman RN CICP-E DPH SFHEA  
Senior Lecturer  
Graduate Infection Prevention and Control Program | School of Nursing and Midwifery, Griffith University  
Gold Coast Hospital and Health Services  
Menzies Health Institute, Queensland  
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Email: [p.zimmerman@griffith.edu.au](mailto:p.zimmerman@griffith.edu.au)  
Ph: +61 7 555 28780  
Twitter: @IPCPau  
Address: Office 2.43, Clinical Sciences 2 (G16), Parklands Drive, Southport QLD 4215 Australia

Appendix H

Distribution of Scores for the IPC Pre-test and Post-tests



# INFECTION CONTROL IN THE LONG-TERM CARE SETTING

## Appendix I

### Levels of IPC at HKAL

<p>Level 1: Hand-hygiene</p> <p>Training- included hand-hygiene, transmission of germs, high touch surfaces, and signs/symptoms of an infection.</p> <p>Resources needed for this particular level: Hand sanitizer stations</p>
<p>Level 2: Personal protective equipment</p> <p>Training- Will include education regarding PPE, and proper use and disposal. Reinforce what was learned in Level 1.</p> <p>Resources needed: Gloves, gowns, masks, eye shields</p> <p>Begin tracking log for HAIs.</p>
<p>Level 3: Isolation precautions</p> <p>Training- Differentiate between each isolation precaution, which are appropriate for what disease, which are appropriate for the facility. What PPE to use for each precaution. Reinforce what was learned in Level 1 and 2.</p> <p>Resources needed: isolation precaution signs and carts.</p> <p>Evaluate practice change once again using observational tools and rate of HAIs.</p>