

Use of a nudge tool for improving hand hygiene in a nursing team in home for elderly people – case study

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ABSTRACT

The prevention and control of healthcare-associated infections are one of the most important indicators of quality in healthcare institutions and their employees. For this purpose, experts in this field are attempting to find improvements; one of them is called “nudging”. This study aims to present the importance of providing hand hygiene quality in nurses and to analyse the effectiveness of a selected nudging tool in practice. An observation checklist was made to evaluate nurses in a selected nursing home in Ljubljana. Based on data analysis, a picture of male eyes as hygiene promotion and how it affects the change in hygiene compliance of the nurses was tested. After a change in the environment, hand hygiene improved; the greatest improvement was seen prior to the preparation of devices for personal hygiene, before the procedure, after washing the patient’s face, body, back and hands, after washing the feet, and after the whole procedure was completed. With the use of behavioural theories, better hand hygiene compliance can be achieved. It can be concluded that nudging may help us prevent and control healthcare-associated infections and provide a higher quality of life for residents and, consequentially, improve the quality of nursing care.

Key words: nursing care, hand, hygiene, elderly, behaviour, employees

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Healthcare-associated infections (HCAI) are very common and are one of the most widespread adverse events in healthcare.

Prevention and control of HCAI is one of the most important elements for providing patient safety and an indicator of the work quality among nurses and homes for the elderly.

INTRODUCTION

The elderly represent a large and increasing segment of the population throughout the world. According to the EUROPOP2008 population projections, people older than 79 are expected to triple in number by 2060, and since long-term care begins to rise exponentially at around 75 to 85 years of age, rapid growth in demand for such service is inevitable for the next fifty years or so [1]. Because of their age, illness, motor disability, general weakness, and dementia, more and more of the elderly live in nursing homes. Healthcare-associated infections (HCAI) are very common and are one of the most widespread adverse events in healthcare. HCAI not only bring financial costs, but extend hospitalization, make a significant contribution to patient mortality, and to permanent disability. Prevention and control of HCAI is one of the most important elements for providing patient safety and an indicator of the work quality among nurses and homes for the elderly [2, 3]. Hand hygiene is considered the most important intervention to prevent and control the spread of HCAI. Nurse's hands are the most common means of transferring microorganisms from the colonized, infected patient, and his environment to other patients. Inconsistent hand hygiene is present in all environments, in the developed and developing worlds and in all profiles of healthcare professionals. The reasons for the inconsistency are many and dependent on the environment, infrastructure, cultural differences and even religion [4]. Numerous research studies state that lack of experience, overburdened schedules, heavy workloads, lack of knowledge and insufficient washing basins are reasons for poor hand hygiene among nurses in the nursing homes. In most cases, hand hygiene is previously used to protect nurses, rather than to protect residents, because the compliance of hand hygiene is higher after contact with the patient than before. More nurses provide better hand hygiene after contact with body fluids in comparison to other forms of contact with the residents or their surroundings [5].

Experts for providing and controlling HCAI are striving to eliminate factors that contribute to poor hygiene of the hands. One current method of improving hand hygiene compliance is called nudging [6]. The idea originates from economics, but it can be used in many areas, including nursing care. It is about behaviour that can be influenced by subconscious cues in the environment, such as sights, smells, and sounds. Nudging acts outside of our conscious awareness and influences our behaviour and cognition. By using the elements of nudging, better results in the field of hand hygiene compliance can be achieved, which, in theory, leads to reducing the incidence of HCAI [7, 8]. The main reasons for using nudging in healthcare are to improve public health (encouraging healthy eating habits, regular physical activity, less smoking, less stressful lifestyle, reducing body weight, etc.); reducing the need for treatment, which is a great expense and, finally, an improvement in the quality of life during hospitalization or living in nursing home [9].

In this way, some hospitals in America have attempted to improve their employee's hygiene. As a nudge, a clean, fresh citrus smell, which came from an aroma dispenser, was used, accompanied by a photograph of

male eyes that was prominently displayed above the alcohol dispenser. The results have shown that people exposed to these specific cues had better hand hygiene compliance [7, 8].

There are other ways to improve hand hygiene compliance. Which alcohol dispenser in the corridor of the hospital is mostly used was observed. Above the dispensers, signs were placed that defined dispensers from the least used (5th place) to the most used (1st place). After these signs were installed, alcohol dispensers were used 250% more frequently than before [10]. A similar study was made at the Gentofte Hospital in Denmark. The nudge consisted of three parts: placement, colour, and normative message. Researchers spent five days watching the frequency of the visitor's hand disinfection. In the Medical Department, alcohol dispensers were primarily located above the sinks inside the hospital wards. The choice of using hand sanitizer is thus offered at a seemingly late point in time, competing against the choice of approaching one's hospitalized relative. For this purpose, they introduced a freestanding alcohol dispenser at the entrance the Medical Department. Disinfectants and dispensers are usually transparent, which made them blend into the surrounding environment. The researchers, therefore, introduced a red sign right above the freestanding dispenser. The last prime was the text message printed on that red sign: "Here we use hand disinfectant in order to protect your relatives". The first part of the text ("Here we use hand disinfection") informs visitors about the most acceptable behaviour in relation to hand hygiene at the hospital. The second part of the text ("in order to protect your relatives") was used to make the consequences of hand hygiene compliance more tangible to visitors by giving them a plausible reason as to why they should engage in positive hand hygiene behaviour. The results indicate that the visitor's hand hygiene compliance, after the introduction of the freestanding alcohol dispenser, increased up to 17%, and after putting the red sign above the freestanding dispenser, up to 64%. The research was not intended for nurses but for hospital visitors, but the same environmental cues could also be used among hospital employees [11].

Hand hygiene compliance can also be influenced by technological promoters. One example is an LCD TV screen which shows what percentage of people washed their hands after using the toilet [12]. The next example is the BIOVIGIL device, which aims to exploit emotional embarrassment. The BIOVIGIL system uses traffic-light colours: green, yellow and red. It works in conjunction with a badge clipped to workers' shirts, which communicates with infrared sensors put in patient's rooms. When the physician or nurse washes his/her hands, they hold them up to the badge's sensors, which will determine whether they are germ-free. If they are, the badge turns green, but if they are not, it turns red. This reminds the patient that a physician or a nurse with dirty hands will touch him. This encourages hospital employees to take care of hand hygiene, as nobody wants to walk around wearing a red badge [13, 14].

Hand hygiene compliance can also be influenced by the visibility and accessibility of alcohol dispensers. Most studies recommend the installation of alcohol dispensers at the entrances and exits to the patient's room and

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They took 10 samples from the medical staff's hands and then showed them pictures of cultures similar to the contamination on their hands.

Afterwards, whether the nurse performed the hand disinfection properly and in accordance with the standards or not was marked.

its surroundings, and near the toilets [15]. The next visual cues were images of bacterial growth designed to motivate hospital staff to comply with hand hygiene regimes. They took 10 samples from the medical staff's hands and then showed them pictures of cultures similar to the contamination on their hands. In a very short time, their hand hygiene compliance increased, which proves that visual triggers are an effective way to motivate nurses and other healthcare providers to clean their hands more often [16]. Automatic dispensers for paper towels in public toilets have been installed to stimulate hand washing, which present a towel with or without user activation. The use of towels was 22.6% higher and the use of soap 13.3% higher [17]. Visual cues also include signs at the door before entering the room. On a piece of paper, the following was written in red: "Warning, this room is under constant supervision of hand hygiene. An error will trigger an alarm, and the violation will be reported." This nudge has been the most successful of all [18].

This research aims to present the importance of ensuring the quality of hand hygiene (with emphasis on hand disinfection) of employees in nursing care and analyses the effectiveness of a selected nudging tool in daily practice among selected nurses.

METHODS

Between October 2016 and February 2017, a literature review on the COBIB.SI, Medline (PubMed), CINAHL, Cochrane and Web of Science databases over a ten-year period (2007–2017) was performed. An intervention study has been made. For the data collection regarding the hand disinfection of eight nurses, an observation checklist was made. Criteria for observing the hand disinfection were determined on the basis of standards of nursing activity [19]. The process of hand hygiene was observed, with an emphasis on hand disinfection. In the measuring instrument (observation checklist), the first column listed the opportunities for hand disinfection (i.e. procedures from the beginning of the personal hygiene procedure to the end, in sequence). Afterwards, whether the nurse performed the hand disinfection properly and in accordance with the standards or not was marked. Does she or he use a sufficient amount of disinfectant (3 ml or two pushes on the dispenser), does hand disinfection last at least 20 s, or disinfect all areas of the arm in the prescribed order (palms, fingers, middle areas and back of the hand) and disable transmission of microorganisms from one part to another [20]? In the observation checklist, there was also a space for observer comments on the conditions during the observation. The last column in the observation checklist was intended to indicate the disturbing and warning factors that remind or deter the observed nurse from acting correctly (e.g. observer presence, full hands, dry and damaged skin of the observed, too much work, forgetfulness, less probability of transmission of infection, disagreement with recommendations, lack of information, thinking that after using gloves, it is not necessary to disinfect the hands, jewellery and long nails, which does not provide correct hand hygiene compliance, call of patient / colleague / physician and personal beliefs).

The observation process took place in a nursing home in Ljubljana from 30 January to 1 March 2017. For the purpose of the observation process, we selected eight nurses, at the nursing care workplace, based on previously obtained consent, from the director of the observed Home for Elderly People. Data processing and names of the selected nurses were anonymous. Three observations per day were carried out, from 7 am to 9 am in the morning shift, in the implementation of personal hygiene of two or three residents. Each nurse was observed throughout the entire work process, but not all the eight observed were observed for equal amounts of time, due to the different working schedules. At the time of observation, notes were made in the observation checklist. The first phase of observation process was carried out without the selected nudge tool, and the second phase was performed with the selected nudge tool (picture of male eyes above the alcohol dispensers). All images were coloured, with dimensions of 6 × 17 cm. Both phases last 14 days. This was followed by a re-analysis of data and a comparison of the results of the first and second observations. The acquired data were processed using MS Excel software. Frequencies and ratios were calculated according to the equation (E1) [21]. A summary presentation of the results was presented in a diagram, and the most common reasons for abandonment or improper hand disinfection were represented.

$$\text{Consideration of hand hygiene} = \frac{\text{number of actual}}{\text{number of occasions}} \times 100$$

RESULTS AND DISCUSSION

There were 75 observations of hand disinfection of 8 nurses in the nursing team without nudging, and then another 75 observations of hand disinfection with nudging. Eight observers represent 16% of all employees in the nursing team. Table 1 shows the results of observing hand disinfection without nudging, with it, and the causes of noncompliance in hygiene behavior. Since all of the eight observed were not observed at the same time and since each of the observed was observed several times a day and several days in a row, the object of the observation is not the number of people who have properly disinfected their hands, but the number of hand disinfection observations. The most correct hand disinfections were performed at the seventh criterion (putting the new gloves on and performing anogenital care; after this is done, gloves are taken off, and hands are disinfected). In 71 observations, the observed nurse disinfected his/her hands correctly. Hand hygiene compliance was also good at the third criterion (i.e. use of gloves immediately before washing areas that are dirty with blood, secretions, saliva, washing the anogenital area and legs; after use of gloves, hands are disinfected). At 67 observations, the nurse observed disinfected his/her hands correctly. At the sixth criterion (i.e. changing the water, disposable washbasin and clothing, following which hands are disinfected) disinfection was done the least or almost never, because this procedure, followed by hand disinfection, was not executed. At a nursing home, nurses do not put the lotion on residents' skin after personal hygiene is made, they do not change the water

The first phase of observation process was carried out without the selected nudge tool, and the second phase was performed with the selected nudge tool.

At a nursing home, nurses do not put the lotion on residents' skin after personal hygiene is made, they do not change the water for each resident, and gloves are rarely changed.

for each resident, and gloves are rarely changed. In addition, hand disinfection was worse at the fourth criterion (i.e. washing the patient's face, body, back and hands, followed by hand disinfection). The observed nurses disinfected their hands in 37 observations at the fourth criterion. After completing the first part of the observation, a tool to promote hand hygiene compliance (picture of male eyes above the alcohol dispensers), was introduced, and then the entire procedure of hand disinfection was observed again. The most compliant observed nurse disinfected his/her hands in accordance with the seventh criterion (i.e. putting the new gloves on and performing anogenital care, following which, gloves are taken off, and hands are disinfected). At the seventh criterion, there were 71 observations. It was established that the observed nurse disinfected his/her hands correctly. The eighth criterion (i.e. gloves are put on again, the lotion is put on the residents and hands are disinfected) was observed the least or almost never. The results are shown in Table 1, in which 100% means that the observed nurse correctly disinfected his/her hands 75 times out of 75 opportunities.

Table 1: Results of hand disinfection observation at the observed nursing team, during the personal hygiene procedure and reasons for non-accomplishment of hygiene requirements

Criterion of observation	A (n)	A Ratio (%)	B (n)	B Ratio (%)	Reasons for non-accomplishment of hand disinfection
1. Hand disinfection and preparation of the items for personal hygiene.	30	40	45	60	Forgetfulness, conversation with an employee rush, dry skin, observed nurse did not disinfect all areas of his/her hands, insufficient amount of disinfectant and too fast disinfection.
2. Hand disinfection before the personal hygiene procedure.	56	75	61	81	Less possible infection transmission dry skin, rush, too fast disinfection, conversation with an employee, insufficient amount of disinfectant, forgetfulness, the observed nurse did not disinfect all areas of his/her hands.
3. Use of gloves before washing the areas that are dirty with blood, secretions, saliva; at washing anogenital area and legs. After their use, hands are disinfected.	67	89	67	89	Rush, conversation with the resident, the observed nurse did not disinfect all parts of his/her hands, too quick disinfection and insufficient amount of disinfectant.
4. Washing the patient's face, body, back and hands, followed by hand disinfection.	37	49	39	52	Conversation with resident, forgetfulness, rush, too quick disinfection, dry skin, insufficient amount of used disinfectant and the observed nurse did not disinfect all areas of his/her hands.
5. Clean gloves are put on. The legs are washed. Gloves are taken off, and hands are disinfected.	52	69	55	73	Forgetfulness, full hands, conversation with an employee, too quick disinfection not enough of disinfectant, rush, the observed nurse did not disinfect all areas of his/her hands.
6. Water, washbasin and the clothes are replaced and, after this, hands are disinfected.	0	0	0	0	The procedure was not accomplished because of the rush.
7. New gloves are put on, and anogenital area is washed. Gloves are taken off, and hands are disinfected.	71	95	71	95	Rush, the observed nurse, did not disinfect all areas of his/her hand, full hands and conversation with the resident.
8. Gloves are put on. Lotion is spread on the resident and hands are disinfected.	6	8	0	0	The procedure was not accomplished because of the rush.
9. After the whole procedure is done, the hands are disinfected.	61	81	63	85	Less disinfectant used, the observed nurse did not disinfect all areas of his/her hand, forgetfulness and full hands.

Legend: A – correct hand hygiene observation without nudging; B – correct hand hygiene observation with nudging; (n – number of observation; % – ratio

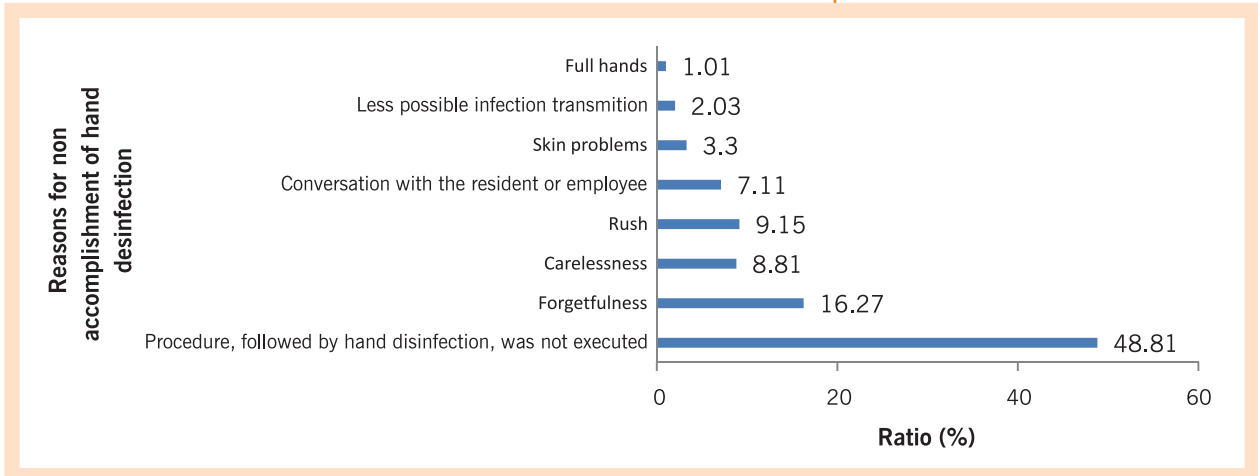


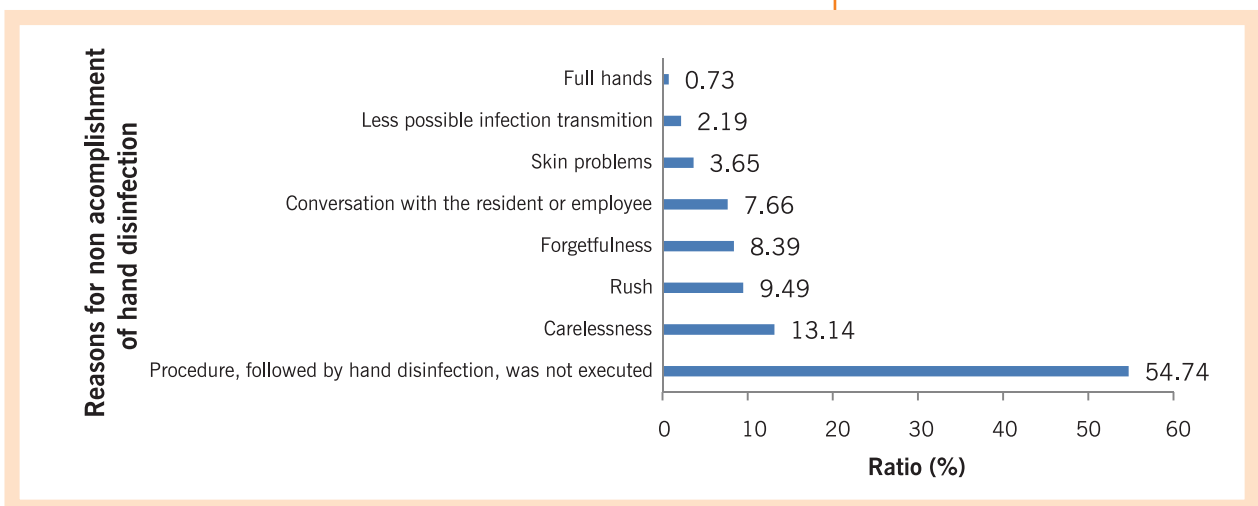
Figure 1: Reasons for non-accomplishment of hand disinfection without the nudge

At the observation process without the use of the selected nudging tool, there were 675 opportunities for hand disinfection. Correct hand hygiene of the observed nurses was conducted 380 times, of which 295 times were done incorrectly. Figure 1 shows the reasons why the observed nurse did not correctly disinfect his/her hands. The most common reason for this was that the procedure followed by the hand disinfection was not made. The least common reason was when the hands of the observed nurse were full of resident's laundry and hygiene supplies. During the observation process with the selected nudge tool, there were 675 opportunities for hand disinfection.

Correct hand hygiene of the observed nurses was conducted 401 times, and 274 times it was not done so. Figure 2 shows the reasons that the observed nurse did not disinfect his/her hands. The most common reason for this was that the procedure followed by hand disinfection was not made. The least common reason was when the observed nurse's hands were full of personal hygiene products and residents' laundry.

In the nursing home, because of the more frequent contact between the staff and residents, HCAI are more common. They contribute to the poorer quality of living in the institution. In the nursing home, the nurs-

Figure 2: Reasons for non-accomplishment of hand disinfection with the nudge



ing team plays a very important role in preventing the transmission of infections to residents, from the resident to the staff and from resident to resident via nursing care supplies and hand contact. With proper hand hygiene, transfer can be effectively prevented [22]. In the considered nursing home in Ljubljana, they decided to record the data of the HCAI occurrence among the residents, in order to determine the quality of hand hygiene and on this basis plan further improvements [23]. They record the infections with MRSA and ESBL. In 2011 they had one HCAI, 2012 three, 2013 six, 2014 thirteen, 2015 nine, and 2016 seven (Table 2). The quality of nursing care is also assessed through the recorded occurrence of HCAI. Therefore, it is crucial that graduate nurses, as carriers of nursing care, determine the needs for the prevention of HCAI, plan and implement interventions for prevention, identify performers and, ultimately, evaluate the performed work and achieved nursing-care goals [2, 23].

Table 2: Number of residents colonized with MRSA and ESBL from 2011 to 2016 in nursing home where research was done

Year	2011	2012	2013	2014	2015	2016
MRSA	1	3	2	5	2	4
ESBL	0	0	4	8	7	3

One of the newer methods of preventing HCAI, and thus ensuring quality in nursing care, is nudging, which, by applying behavioral theory, affects the behavior of employees. According to the literature review, the most effective promoters of hand hygiene behavior were: the citrus smell from air fresheners (hand disinfecting was improved by 32%), the image of male eyes above the disinfectant dispensers (hand disinfection improved by 18%), numbers 1 to 5 defining alcohol dispensers as the most or the least used (hand disinfection improved by 250%), a red sign above the alcohol dispenser (disinfection improved by 64%) and an automatic paper towel dispenser (disinfection improved by 22%). In this study, a visual cue was used to improve the hand hygiene of the observed nurses. The nudge tool was the image of male eyes that were placed above the disinfectants in the living room, in the corridor, in the bathroom and on the nursing cart (Figures 3, 4, 5). All images were in color, with dimensions of 6×17 cm [6, 7].

Among the residents, only two older women noticed them and asked the researcher about their meaning. On the first day of installation, the images caused a lot of attention and interest among the employees in and out of the department. All the employees said that the pictures were awful, frightening, and they felt that they had constantly been observed.

In the beginning, several days were spent observing the nurses without recording the results on the observation checklist, so that the nurses became accustomed to the presence of the researcher. Data recording then started. It was discovered that the observed nurses did not consider the prescribed hygiene standards of hand disinfection in the accomplishment



Figure 3:
Picture of male eyes above automatic alcohol dispenser (Photo: Mlakar, 2017)



Figure 4:
Picture of male eyes next to the alcohol dispenser and the soap dispenser (Photo: Mlakar, 2017)



Figure 5:
Picture of male eyes at the alcohol dispenser on the wagon for personal hygiene items (Photo: Mlakar, 2017)

of the entire personal hygiene process. They almost never disinfected their hands after changing the water and clothing and after putting the lotion on the resident, because the procedure followed by hand disinfection was not executed. Furthermore, disinfection of the hands was slightly worse after washing the face, body, back and hands, as the observed were in a hurry during the procedure and often forgot to replace the gloves and dis-

The reasons that the observed nurses did not disinfect their hands correctly or did not disinfect them at all are tiredness, early morning hours, rush, distracted thinking and the observed simply forgot about the proper hand hygiene.

infect their hands. Disinfection immediately before preparing personal hygiene products was also a bit worse. Often the reason was forgetfulness and conversation with colleagues or students on practical training. Thinking that hands are clean at the beginning of the day and disinfecting damaged hands can be painful, which deters the employees from disinfecting their hands again when they come to work. The most correct and precise hand disinfection was after the glove use, immediately after the contact with areas that were dirty with blood, secretions, and saliva, and washing the anogenital area. Hand disinfection was also good after the whole procedure was finished. The results showed that the observed employees' hand hygiene was the most precise after contact with the patient. More observed nurses attend proper hand hygiene after body fluid contact, compared to other contacts with the resident or his/her surroundings. At other recorded incomplete hand disinfection, employees in most cases used sufficient amounts of soap, but their hand disinfection was too short, or they did not disinfect all hand areas. Observer's hands were without jewellery; nails were short and without nail polish. This is very important in preventing HCAI, as most microorganisms accumulate under long nails and under jewellery, with which good disinfection is very hard to provide.

The reasons that the observed nurses did not disinfect their hands correctly or did not disinfect them at all are tiredness, early morning hours, rush, distracted thinking and the observed simply forgot about the proper hand hygiene. This happened mostly during the hygiene product preparation and then during the process. Conversation with an employee or a resident during the process often distracts the observed from the correct hand disinfection technique, because his/her attention is focused on the conversation. For this reason, hand disinfection was superficial. The observed nurses spend less than 20 seconds for disinfection, with not enough disinfectant (less than 3 ml or two pushes on the alcohol dispenser), or she/he does not disinfect all hand parts. Each health institution prescribes a regime of hand disinfection and hand washing techniques, which must be followed in the correct order so that all hand areas are disinfected (palms, fingers, middle spaces and back of the arms) [20]. One very common reason for the hand hygiene inconsistency was being rushed. In the observed nursing home ward, 20 immobile residents live. On a shift, only three nurses and two students of the health faculty in Ljubljana work there. Given the number of nursing procedures that the staff had to do, they had to hurry, so they could finish the work by breakfast, and then continued with bathing the patients and other procedures. This is a department with mostly residents with dementia; consequently, performing personal hygiene lasts even longer because of the specific factors of movement, understanding, and communication. In addition, the employees need a lot of time to explain to the residents what they are going to do, and to obtain their cooperation and permission to carry out the procedure. The number of employees and overcrowded departments are two of the biggest problems in the observed nursing home. The HCAI occurrence is inversely proportional to the number of health care providers [2].

Because the observation was executed in winter, many nurses had problems with dry and cracked skin, which made hand disinfection very

painful. Many had skin problems, not only because of the weather and season but also because of the daily multiple hand washing with soap and water. Therefore, the employees avoided hand disinfection, especially when they thought that there was a minor possibility of infection transmission (during the preparation of the hand hygiene nudge tool). They did not change their gloves so they would not need to disinfect their hands [23]. Changing the water and putting the lotion on the resident are two procedures that were almost never performed because of the rush and way of working in the nursing home. Therefore, there was no hand disinfection. During personal hygiene performance, it was also necessary to carry away the dirty laundry from the resident's room (pyjamas, other clothes, and other items), because of which the observed nurse had full hands and, therefore, did not disinfect them.

The reasons, from the most frequent to the least, that the observed nurse did not why he/she did not properly disinfect hands (or at all) during observation without the nudge are: forgetfulness, carelessness regarding disinfection, rush, conversation with an employee or resident, damaged skin of the observed nurse, less likely infection transmission, and full hands. These are also the most common reasons that nurses have bad hygiene compliance.

After the first part of the observation was finished, the nudge was introduced. It was determined that the hand disinfection before the preparation of personal hygiene products was improved by 20%, before starting the procedure by 6%; after the glove use after washing the dirty areas with blood, secretions, saliva, washing the anogenital area and feet, the result remained the same; after washing the face, body, back and hands, hand disinfection improved by 3%, after washing the feet by 4%; after changing the water and washbasin, the result remained unchanged. Furthermore, after anogenital care, after putting on the lotion, and after the whole procedure of personal hygiene was done, hand disinfection improved by 4%. In research studies [7, 8], the results show that employees who were exposed to triggers (picture of men's eyes above the dispensers) had better hand hygiene compliance. It can be concluded that nursing staffs' actions can be improved if they are exposed to specific cues. Therefore, nudging could be used as a way of preventing HCAI and as a new and better method for changing employees' behavior, with the purpose of improving the living quality of residents in a nursing home [24, 25].

The main reason for incorrect hand hygiene compliance at the observation with the nudge is in the first place the same as in the previous observation: the procedure followed by hand disinfection was not executed. The second reason is carelessness, followed by rush, forgetfulness, conversation with the resident or employee, skin damage of the observed nurse, less possible infection transmission, and full hands. As a reason for incorrect hand disinfection, forgetfulness moved from the second place to the fourth. It can be concluded that the visual cue had the strongest effect on this reason.

More proper hand disinfection because of observer presence was not observed. There are students from a health faculty in Ljubljana present

During personal hygiene performance, it was also necessary to carry away the dirty laundry from the resident's room.

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Quality is an indispensable and essential element of nursing care.

throughout the year, and the staff is accustomed to their presence. Those who are consistent with personal hygiene procedures are also consistent with hand hygiene compliance.

The employees in the observed nursing home ward are aware of the importance of good hand hygiene and are convinced that HCAI is a major problem in nursing care and healthcare in general. They also say that if there were more employees, they would also have more time for residents and provide better nursing care for each one. The nudge accomplished its purpose, as the consistency of hand hygiene improved the most before the preparation of personal hygiene products, before starting the procedure, after washing the patient's face, body, back and hands, after washing the legs, and after the whole procedure was done. In those procedures (after using gloves after washing areas that are dirty with blood, secretions, saliva, washing the anogenital region and legs) for which hand disinfection was good even before the introduction of the nudge, there was no difference. After the introduction of the nudge, hand hygiene improved the most at the beginning, during the preparation of the devices, compared to other stages of the personal hygiene procedure. The reason is that the observed nurse stayed the longest with the cart supplies, disinfectants, and the picture of men's eyes above the disinfectant, while they were preparing personal hygiene items and the fact that there was the most noticeable difference in comparison to the previous poor hand disinfection.

Alcohol dispensers were always full in the observed ward. One automatic alcohol dispenser was installed in the corridor, another in the dining room next to the washbasin, a third on the cart for hygiene items and a fourth in the bathroom next to the washbasin (Figure 1). This is a novelty that attracted a lot of attention in the nursing home among employees, residents, and visitors. Depending on the amount of disinfectant in the alcohol dispenser, there was a greater consumption than with standard alcohol dispensers. Automatic disinfectants measure a sufficient or appropriate amount of disinfectant. They represent something technologically new, interesting, and are also very appealing. As with pictures above alcohol dispensers, they represent a nudge to promote hand hygiene behavior, using the latest technology. From this, it can be concluded that the observed nursing home is already using a new way of preventing the HCAI and thus provide high living quality of the residents. This is also confirmed by the data. The number of residents with HCAI during the years of data recording is low, ranging from 0 to 13 (Table 2). The recording of the numbers of HCAI (MRSA and ESBL) started in 2011.

CONCLUSION

It is vital that residents in nursing homes feel well, comfortable, and safe and that there is the highest possible quality of living and nursing care. Quality is an indispensable and essential element of nursing care. Knowledge and considering prevention and control methods of HCAI is imperative for all healthcare providers because it prevents negative con-

sequences, such as the social isolation of the resident, early death, and disability. Nurses in the observed nursing home partially consider the prescribed hygiene standards regarding hand disinfection. Observed nurses almost never disinfected their hands after changing the water, the clothes, and after putting the lotion on the resident because this procedure, followed by hand disinfection, was not executed. Moreover, hand disinfection was worse after washing the residents' faces, bodies, backs, and hands, and before preparing personal hygiene items. The most correct and accurate was hand disinfection after use of the gloves, immediately after the contact of the areas that were dirty with blood, secretions, saliva, washing the anogenital area and after the working procedure was completed. After the implementation of the nudge, hand disinfection before the preparation of personal hygiene items, before the beginning of the procedure, after washing the patient's face, body, back and hands, after washing the legs, and disinfection after the whole procedure had been done improved the most. There was no difference after nudging for the procedures for which disinfection was already performed well: after the use of gloves after washing the areas that were dirty with blood, secretions, saliva, and washing the anogenital region and legs. Based on this research, we can conclude that employees hand hygiene behavior may be subconsciously influenced by cues in the environment. Furthermore, an increased number of employees in the nursing home would contribute to this, as the staff would have more time for residents. Finally, in preventing the HCAI, motivation, clearly defined goals, high professional qualifications, and teamwork of all employees in the nursing home ward are also important.

Based on this research, we can conclude that employees hand hygiene behavior may be subconsciously influenced by cues in the environment.

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