

Hand hygienic disinfection of nurses – knowledge and its practical use

Higieniczna dezynfekcja rąk wśród pielęgniarek – wiedza i jej praktyczne wykorzystanie

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STRESZCZENIE

HIGIENICZNA DEZYNFEKCJA RĄK WŚRÓD PIELĘGNIAREK – WIEDZA I JEJ PRAKTYCZNE WYKORZYSTANIE

Cel pracy. Ocena poziomu wiedzy teoretycznej pielęgniarek na temat higienicznej dezynfekcji rąk oraz jej stosowania w pracy zawodowej.

Materiał i metody. Przeprowadzono badanie ankietowe, uzupełnione obserwacją z zapisem w arkuszach obserwacyjnych. Grupa respondentów składała się z 60 pielęgniarek/pielęgniarzy pracujących na oddziałach wewnętrznych i chirurgicznych.

Wyniki. Wiedza teoretyczna badanych pielęgniarek jest na poziomie średnim. Obserwacje wykazały, że pielęgniarki/pielęgniarze nie kładą nacisku na higieniczną dezynfekcję rąk podczas normalnych codziennych czynności, a poziom jakości higienicznej dezynfekcji rąk jest niski.

Wnioski. Higieniczna dezynfekcja rąk jest jednym z ważnych wskaźników jakości opieki zdrowotnej. Konieczne jest podniesienie poziomu wiedzy teoretycznej pracowników służby zdrowia, a jednocześnie umożliwienie pracownikom służby zdrowia praktykowanie higienicznej dezynfekcji rąk i przekazywanie odpowiednich informacji na ten temat.

Słowa kluczowe: higieniczna dezynfekcja rąk, pielęgniarki, jakość

ABSTRACT

HAND HYGIENIC DISINFECTION OF NURSES – KNOWLEDGE AND ITS PRACTICAL USE

Aim. To find out the level of theoretical knowledge of nurses working in the internal medicine and surgical wards about hygienic hand disinfection and to evaluate its application during work performance.

Material and methods. A questionnaire was conducted, supplemented by observations with records in the observation sheets. The group of respondents consisted of 60 nurses working in the internal medicine and surgical wards.

Results. The theoretical knowledge of a selected sample of nurses reaches an average level. The observations have proved that nurses do not put emphasis on hygienic hand disinfection during everyday activities and the level of quality of hygienic hand disinfection is low.

Conclusions. Hygienic hand disinfection is one of the important indicators of the quality of the health care provided. It is necessary to increase the level of the theoretical knowledge of healthcare professionals and, at the same time, to enable healthcare professionals to practise hygienic hand disinfection and to provide efficient feedback.

Key words: hygienic hand disinfection, nurses, quality

INTRODUCTION

Hygienic hand disinfection is the most important preventive measure in the struggle against infections caused in medical facilities. As many as 98 000 patients hospitalized in the hospitals in the Czech Republic on any day have at least one healthcare-associated infection, which corresponds to one in fifteen hospitalized patients. The occurrence of infections associated with health care prolongs the time of hospitalization, complicates the disease itself, and increases the cost of the patient treatment [1]. According to the WHO, hygienic hand disinfection is the least demanding activity, best controlled with a significant degree of efficiency [2]. Healthcare professionals' hands are the most common source of healthcare-associated infections [3]. Knowledge of situations that require performing hygienic hand disinfection is of crucial importance when performing hygienic hand disinfection. At the same time, the practical knowledge of the correct procedure for maximum effectiveness of hygienic hand disinfection is significant [1]. Lack of time, insufficient or unavailable equipment needed for hygienic hand disinfection, dermatological problems with the use of disinfectant and deficient knowledge of correct procedure are the main factors that make it difficult for nurses to perform hygienic hand disinfection correctly [4-7]. Preventive educational programmes have a positive effect on the quality of hygienic hand disinfection [8,9]. A considerable part of the process is a regular training with repetition of the correct procedure and practising the hygienic hand disinfection [10]. More patients die of healthcare-associated infections in Europe than of other monitored infectious diseases. It is estimated that about half of healthcare-associated infections were preventable. The main precautions of the European Centre for Disease Prevention and Control include prevention and control of infections, including hygienic hand disinfection and rigorous screening of carriers, education of all healthcare professionals, education and better awareness of patients and their families, antibiotics, support of microbiological diagnosis, monitoring of infections associated with healthcare at local and national level [1].

AIM

The aim of the study was to determine the level of theoretical knowledge of nurses working in the internal medicine and surgical wards about hygienic hand disinfection and to verify whether this knowledge is used by health professionals in the performance of their profession to determine possible connections and to compare the results of nurses from internal and surgical wards.

MATERIALS AND METHODS

The knowledge about hygienic hand disinfection of nurses was evaluated by the method of quantitative, cross-sectional – questionnaire survey. A non-standardized questionnaire of author's own design was used. It was based on an extensive research of professional literature. The basic documents, while creating the questionnaire,

were the WHO guidelines on hand hygiene in health care, the Guidelines European Centre for Disease Prevention and Control and the Bulletin of the Ministry of Health of the Czech Republic. Then, there were studies that were also used in the discussion. The questionnaire was divided into three parts, namely demographic data, a knowledge part focused on disinfectant solutions and a part related to general procedures for performing hygienic hand disinfection. The knowledge-based part of the research, consisting of a questionnaire survey, was supplemented by observations. Twenty situations were randomly selected, 10 in the internal medicine department and 10 in the surgical department, and it was monitored, whether general and practical nurses perform hygienic hand disinfection in the indicated cases, whether they follow the right hygienic hand disinfection procedure, and use the available protective equipment. The parts included in the observation were selected according to the WHO recommendations, which define the situations when it is necessary to perform hygienic hand disinfection.

Participants

The sample of respondents included in the questionnaire survey consisted of nurses working in standard surgical or internal medicine wards, aged from 19 to 50, of which 58 respondents (96.7%) were women and 2 respondents were men (3.3%). Respondents were selected by deliberate and systematic selection, based on predetermined criteria, namely: minimum age of 19 years, employment in a selected medical facility, job classification of the nurse, willingness to cooperate in the research. All enrolled respondents were informed about their voluntary participation in the research survey and were instructed that by completing and submitting the questionnaire, they expressed their consent to be included in the study.

Data analyses

The results of the questionnaire survey were processed in MS Office Excel and STATISTICA, descriptive statistics with indexes – mean, mode, median, minimum and maximum value, and standard deviation. The consent of medical facility where the collection of data took place was secured, and all respondents agreed to participate in the research survey. After performing descriptive statistics, a qualitative analysis of the obtained results and a comparison and a reflection on the causes of the results in the discussion were performed.

RESULTS

In the monitored group of nurses in the surgical wards, most respondents were in the age category 36-45 years (53.4%) with the average length of nursing practice 19.2 years. In the monitored group of nurses in the internal medicine wards, most respondents were in the age category 19-25 years (33.4%) with the average length of nursing practice 2.4 years. After the demographic survey, the nurses were asked about their self-reflection when performing the hygienic hand disinfection. As many as 86.7% of nurses in the surgical wards believed that they performed the hygienic hand disinfection correctly and in the indicated situations. The rest of the nurses in the surgical wards (13.3%) admitted that they did not follow these principles.

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Then 66.7% nurses in the internal medicine indicated that they perform the hygienic hand disinfection correctly. When it comes to 30% of the remaining nurses, they stated that they do not perform the hygienic hand disinfection correctly and 3.3% chose the answer “I do not know if I perform the hygienic hand disinfection correctly”.

In the part of knowledge, the theoretical knowledge of nurses about the choice of a suitable disinfectant, the optimal amount of disinfectant, exposure time, critical stages in the procedure of hygienic hand disinfection, situations in which the hygienic hand disinfection should be performed and general principles of the hygienic hand disinfection were evaluated. The best level of the theoretical knowledge was achieved when nurses chose an answer to mechanical washing in the presence of *Clostridium difficile* infection. They answered correctly in 77.3% of cases. The number of the correct answers was the same for both the internal and the surgical disciplines.

When choosing the general principles of the hygienic hand disinfection, 63.3% of nurses chose at least 3 correct principles, of which 46.7% of internal medicine nurses and 36.7% of surgical nurses marked all correct answers. Two correct answers were reported by 53.3% of internal medicine nurses and 36.7% of surgical ward nurses. When it comes to 16.6% of nurses in the surgical department, they did not choose more than one of the general principles of the hygienic hand disinfection.

When marking the exposure time, more than half of the nurses chose the correct answer, namely 58.3%, while 50% of the nurses chose the correct answer in the internal medicine ward and 66.6% in the surgical ward.

The nurses chose the least correct answers when labeling the appropriate disinfectant. In total, 29.2% of nurses marked all offered disinfectants as suitable for the hygienic hand disinfection. Internal medicine nurses marked all suitable disinfectant in 23.3%, surgical nurses in 13.3%. One of the possible disinfectants was not identified by 33.3% of nurses from internal medicine and 10% of nurses from surgical ward. One suitable or no suitable disinfectant was chosen by 43.3% and 76.7% of nurses respectively.

Critical areas for the hygienic hand disinfection were correctly identified by 37.5% of nurses. All critical areas were correctly determined by 16.7% of internal medicine nurses and 6.7% of surgical nurses. One situation of all the correct ones was not marked by 60% of internal medicine nurses and 46.7% of surgical nurses. Two or more mistakes were made by 23.3% of internal and 46% of surgical nurses. The ideal amount of disinfectant was chosen by 55% of all the interviewed nurses – 50% were in internal medicine ward and 60% were in the surgical ward. Table 1 shows the descriptive statistics performed.

■ Tab. 1. Descriptive Statistics

	n	M	Mod	Me	Mod(X)	Min	Max	s ²	SD
General wards	30	6.07	6.0	8.0	8.0	1.0	9.0	3.93	1.98
Surgical wards	30	5.57	6.0	more	7.0	2.0	8.0	3.01	1.74

n – number of respondents; M – average; Mod – modulus; Me – median; Mod(X) – frequency of mode; Min – minimum; Max – maximum; s² – variance; SD – standard deviation

■ Tab. 2. Comparing areas

T-test	M GW	M SW	Value t	df	p	n GW	n SW	SD GW	SD SW
general wards x	6.07	5.57	1.04	58.00	0.30	30.00	30.00	1.98	1.30
surgical wards									

M – average; GW – general wards; SW – surgical wards; df – degrees of freedom; p – critical value; n – number of respondents; SD – standard deviation

The nurses in the internal medicine ward achieved a slightly higher level of theoretical knowledge but no statistical significance was demonstrated, as shown in Table 2.

Subsequent observation was focused on important aspects of the hygienic hand disinfection, namely, its implementation before and after the intervention, the use of gloves in the indicated cases, compliance with the exposure time. Adherence to the correct procedure of the hygienic hand disinfection was assessed. The observations were evenly divided into the surgical type ward (Tab. 3.) and the internal medicine ward (Tab. 4). The observation

■ Tab. 3. Comparing areas

Nurse	Durance of nurse's practice (years)	Nursing performance	HHD before procedure	HHD after procedure	HHD between patients	Use of gloves	Compliance of exposure time	Following of the correct procedure HHD
1.	3	Rebandaging surgical wound	no	yes	---	yes	yes	no
2.	11	Oral administration of drugs	no	no	no	---	no	no
3.	6	Bed care	no	yes	---	yes	yes	no
4.	5	Measuring blood glucose with a glucometer	no	no	no	no	---	no
5.	23	Administration of intravenous drugs	no	no	---	no	---	no
6.	19	Rebandaging surgical wound	yes	yes	---	yes	no	no
7.	2	Insertion intravenous	no	yes	---	yes	yes	no
8.	10	Peripheral the permanent urinary catheter	yes	yes	---	yes	yes	yes
9.	10	Subcutaneous injection	no	no	---	---	no	no
10.	26	Rebandage external fixator	yes	yes	---	yes	yes	yes

HHD - Hand hygienic disinfection

■ Tab. 4. Observation sheet – general wards

Nurse	The duration of nurses' practice (years)	Nursing performance	HHD before procedure	HHD after procedure	HHD between patients	The use of gloves	Compliance of exposure time	The evaluation of whether the correct procedure HHD
1.	26	Peripheral venous catheterisation	no	yes	---	no	no	no
2.	28	Taking of blood	no	yes	---	no	no	no
3.	1	Hygienic care of patient	no	yes	---	yes	yes	no
4.	20	Oral administration of drugs	yes	no	no	---	yes	no
5.	28	Peripheral venous catheterisation	yes	yes	---	no	yes	no
6.	23	Peripheral the permanent urinary catheter	no	yes	---	yes	yes	no
7.	2	Measuring blood glucose with a glucometer	yes	yes	no	no	no	no
8.	20	Administration of infusion	no	no	---	no	no	no
9.	5	Subcutaneous injection	no	no	---	---	no	no
10.	10	Administration of infusion	yes	yes	---	no	yes	no

HHD – Hand hygienic disinfection

sheets indicated the length of the nurse's practice, the nursing procedure performed, the hygienic hand disinfection before, after and between patients, the use of gloves if the type of nursing procedure allows using them, compliance with exposure time and evaluation whether the correct procedure of the hygienic hand disinfection had been followed.

DISCUSSION

The aim of the study was to determine the level of the theoretical knowledge of nurses about the hygienic hand disinfection and to verify how nurses in practice use the knowledge. The topic of the hygienic hand disinfection is a current topic and most of the studies selected for discussion focus on both components, theoretical knowledge as well as clinical practice observation. Observations in all the studies mentioned five situations recommended by the WHO, where the hygienic hand disinfection should be performed. Namely, performing the hygienic hand disinfection before the contact with patients, after the contact with patients, after the exposure to body fluids, before the aseptic procedures and after the contact with patients' surroundings [2].

Non-compliance with the exposure time of the disinfectant, omitted hygienic hand disinfection before the intervention and the absence of the use of gloves in the indicated situations were assessed as the most problematic. The same problems were mentioned in the observation study of Polat et al. [11], focused on assessing the observance of the hygienic hand disinfection in nurses working in the intensive care units. More than half of the monitored nurses there did not wear gloves in the indicated situations, 50% did not perform the hygienic hand disinfection before their contact with patients, and 33.3% after their contact with patients. In a French study by Boudjema et al. [12], the method of remote video recording was used where the aim of the study was to evaluate the hygienic hand disinfection and isolation measures in the common practice. The study involved paramedics,

doctors, general nurses and ancillary staff. The study identified wearing of gloves as problematic. In addition to their absence in the indicated situations, it also showed the opposite situation. Wearing gloves in situations that were not indicated caused a significant reduction in the hygienic hand disinfection. Prior to their contact with patients, 42.9% of the healthcare professionals performed the hygienic hand disinfection. In contrast, higher levels of hygienic hand disinfection were observed in a 24-hour observational study [7], where not only healthcare professional were monitored but also patients and visitors. In this study, general nurses in two selected wards performed the hygienic hand disinfection prior to their contact with patients in 67.7%, 100% before aseptic surgery, 92.5% after exposure to body fluids, 80.5% after contact with patients and only 50% after contact with patients' surroundings. Considerably higher knowledge of exposure time was found in the study of Hammerschmidt et al. [13], with a focus on theoretical knowledge and their verification in practice. In this study, general nurses focusing on geriatrics answered correctly in 79%, which was 20% more than the respondents in our study. The studies were also identical in the degree of differences in the healthcare professionals' subjective evaluation of their own performance. They assessed their knowledge as sufficient and most of them believed that they performed the hygienic hand disinfection correctly, which was not confirmed by objective observation.

Training programmes and educational courses were an important element of the hygienic hand disinfection. They showed successfulness not only in the level of increasing theoretical knowledge, but they also had an important impact on the frequency of the hygienic hand disinfection and its quality. In a Japanese comparative study from 2018 focused on finding out properly performed hygienic hand disinfection, the authors confirmed the effect of increasing the number of performed hygienic hand disinfection before and after the contact with patients by 12%, before aseptic procedures by 30%, and after the contact

with patients' environment by 21% [14]. There was a 10% improvement from 80.2% to 90.9% in the level of hygienic disinfection in general nurses as part of a German campaign aimed at increasing the awareness of health professionals about hygienic hand disinfection. The study participants worked in intensive care units in the years 2013–2017. The respondents were provided feedback depending on observations, errors were discussed, and there was provided the scope for improvement. Apart from general nurses, doctors, medical auxiliary staff, and patients' visitors were involved in the study [15]. The available research materials show that training programmes were an effective way to increase the knowledge and quality of the hygienic hand disinfection performed by healthcare professionals. When including training, it is proper to focus on specific reasons that led nurses and healthcare professionals in general to unthorough hand disinfection. One of the possible reasons for that, apart from the ignorance, is a lack of time [16], high workload [17], an urgency to deal with acute situations [6], a burnout syndrome [18], and specific organizational factors [13]. Nurses themselves mentioned that lower workload, an appropriate adjustment of their work environment, and an easy access to disinfectants could facilitate the observance with the basic rules of the hygienic hand disinfection [16].

CONCLUSIONS

The study revealed shortage of theoretical knowledge in the involved sample of nurses. The observations exposed deficiency in the implementation of the hygienic hand disinfection, especially in the implementation of hygienic hand disinfection before a contact with patients, compliance with the exposure time and the use of gloves. Hygienic hand disinfection is an important element in providing quality patient care. It is necessary to increase and deepen the theoretical knowledge in the field of hygienic hand disinfection. Feedback for healthcare professionals should become a part of regular trainings with practical drills. Other directions of research could contribute to increasing the rate and improving the quality of the hygienic hand disinfection. It could be done by implementing training programs aimed at increasing and deepening the theoretical knowledge of general nurses with the possibility of repeated practical drill of hygienic hand disinfection. Feedback when verifying knowledge and practicing hygienic hand disinfection should not be neglected. It would point out the weaknesses and give healthcare professionals the opportunity to objectively assess their knowledge and skills. Equally important is the education of other healthcare professionals, patients and people who come to visit medical facilities.

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REFERENCES

1. Krajská hygienická stanice libereckého kraje se sídlem v Liberci. Infekce spojené se zdravotní péčí – hrozba pro bezpečnost pacientů v Evropě. 2018, [cit. dne 2.3.2020]. Available: https://www.khsbc.cz/wp-content/uploads/Poster_inf_zdravotni_pece_18.pdf
2. World Health Organization. WHO guidelines on hand hygiene in health care. First global patient safety challenge clean care is safer care. 2009, [cit. dne 18.2.2020]. Available: https://apps.who.int/iris/bitstream/handle/10665/44102/9789241597906_eng.pdf;jsessionid=736E1CBA42F40732E0162127EC3302F4?sequence=1
3. Reichardt Ch, Bunte-Schönberger K, Van Der Linden P. Hygiene a dezinfekce rukou: 100 otázek a odpovědí. 2. vyd. Praha: Grada Publishing, 2017.
4. Graveto JMG, Rebola R, Fernandes E et al. Hand Hygiene: nurses' adherence after training. *Rev Bras Enferm.* 2018; 71(3): 1189-1193.
5. Hutzschenreuter L, Hübner NO, Dittmann K, et al. Potential of innovations in hygiene management – a managerial perspective. *Antimicrobial Resistance and Infection Control.* 2019; 8: 100-110.
6. Jeansen A, Coen PG, Drey NS, et al. The development of hand hygiene compliance imperatives in an emergency department. *American Journal of Infection Control.* 2018; 46(4): 441-447.
7. Randle J, Arthur A, Vaughan N. Twenty-four hour observational study of hospital hand hygiene compliance. *J Hosp Infect.* 2010; 76: 252-255.
8. Erkan T, Findik UY, Tokuc B. Hand-washing behaviour and nurses' knowledge after a training programme. *International journal of nursing practice.* 2011; 17: 464-469.
9. Freeman JT, Dawson L, Jowitt DM, et al. The impact of the Hand Hygiene New Zealand programme on hand hygiene practices in New Zealand's public hospitals. *NZMA.* 2016; 129(1443): 67-76.
10. Assadollahi M, Bostanabad MA, Jebrailli M, et al. Nurses' Knowledge Regarding Hand Hygiene and Its Individual and Organizational Predictors. *Journal of Caring Sciences.* 2015; 4(1), 45-53.
11. Polat S, Gurol AP, Cevik U. Hand hygiene compliance of nurses: A 5 – unit observational study in North-Eastern Anatolia. *International Journal of Nursing Prac.* 2011; 17: 435-440.
12. Boudjema S, Reynier P, Dufour JC, et al. Hand Hygiene Analyzed by Video Recording. *J Nurs Care.* 2016; 5: 338.
13. Hammerschmidt J, Manser T. Nurses' knowledge, behaviour and compliance concerning hand hygiene in nursing homes: a cross-sectional mixed-methods study. *BMC Health Services Research.* 2019; 19: 547.
14. Harada C, Tani A, Goto A. Education on hand disinfection focusing on five important timing. 2018, [cit. dne 10.4.2020]. Available: <https://tokushima.hosp.go.jp/files/000060672.pdf>
15. Hoffmann M, Sendlhofer G, Gombotz V, et al. Hand hygiene compliance in intensive care units: An observational study. *International Journal of Nursing Practise.* 2019; 26(2): 1-8.
16. Scheithauer S, Balzer B, Dangel M, et al. Workload even affects hand hygiene in a highly trained and well-staffed setting: a prospective 365/7/24 observational study. *J Hosp Infect.* 2017; 97(1): 11-16.
17. Sadule-Rios N, Aguilera G. Nurses' perceptions of reasons for persistent low rates in hand hygiene compliance. *Intensiv Crit Care Nurs.* 2017; 42: 17-21.
18. Manomenidis G, Panagopoulou E, Montgomery A. Job Burnout Reduces Hand Hygiene Compliance Among Nursing Staff. *J Patient Saf.* 2019; 15(4): 70-73.

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