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Original article

HANDS HYGIENE AND PERSONAL PROTECTIVE EQUIPMENT – MONITORING OF THEIR APPLICATION IN THE NURSES' CLINICAL PRACTICE

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ABSTRACT:

Purpose: Health care-associated infections (HCAIs) are considered infections that are contracted by the patient in connection to the medical service of another disease. The mechanism of transmitting microorganisms via contact is the most important and common one of disease transmission. This research aims to monitor activities requiring hand disinfection and the use of personal protective equipment (PPE) by the nurses in a real hospital environment.

Material and methods: The research is held in May 2019 via a secretly structured monitoring in natural conditions at four wards in the University Hospital Kanev Ltd, Ruse, Bulgaria, on randomly selected weekdays.

Results: A total of 320 procedures of the nurse's daily activity are being monitored, which are connected to infections with both blood and body fluids, as well as the risk of looking after patients who are unable to look after themselves. In the Ward of Orthopedics and Traumatology, gloves are being used in all of the monitored activities, but after contact with a patient, only the hands are being washed. When expected to be contaminated with blood and body fluids, the nurses don't always use gloves and also don't always disinfect their hands before aseptic procedures and when they bandage a wound.

Conclusions: The nurses don't follow the requirements for hygienic handwashing and the use of PPE. The goal of the current research was not about explaining whether this is due to a lack of knowledge of cases where the use of gloves or protective equipment is required and how and when the hands are washed.

Keywords: personal protective equipment, health care-associated infections, nurse, medical service, handwashing, medical gloves, hospital environment,

INTRODUCTION

There is constant contact between the objects of infection (patients) and the medical staff in hospital conditions, at which contact the disease transmission is much easier, and the spread of the disease is increased. The diseases may be contracted either in a hospital or the patient himself be a source of blood-borne infections, such as HBV, HCV, HIV.

A risky exposure at the working place maybe the contact with damaged skin, mucosa and percutaneous inoculation (needle sting, a wound caused by a tool). Potentially contagious body fluids are: blood, saliva, cerebrospinal fluid, secretions and excreta, etc. In general, all body fluids are considered potentially contagious. Health care-associated infections (HCAIs) are considered infections that are contracted by the patient in connection to the medical service of another disease. The mechanism of transmitting microorganisms via contact is the most important and common one of disease transmission, and it can be either from a direct, indirect and airborne contact. Any medical care – full or partial toilets, bathing, bandages, injections or other manipulations display such risk. In order to prevent and control HCAIs, observance of asepsis and antiseptics is required, and also hygienic handwashing and hygienic hand disinfection, and the use of personal protective equipment (PPE) - masks, gloves, protective clothing, etc. in the daily medical practice. The mandatory application of the set of standard protective measures while caring for all patients provides a high rate of protection for patients, medical staff and third persons [1].

The mechanism of transmitting microorganisms via contact is the most important and common one of HCAIs, and it can be either from a direct, indirect and airborne transmission [2-4].

The hands are the main factor for transmitting infections, particularly important in hospitals. WHO recommends hand disinfection with an alcohol-based antibacterial fluid as the golden standard of hygiene in medical practice. Clean hands are a mandatory medical practice that provides safety for looking after a patient. Washing one's hands hygienically is done with common soap, whereas disinfection is achieved by rubbing antibacterial fluid (preferably alcohol-based) on the whole hand surface, which aims to reduce the available microbe flora [5, 6].

The WHO consensus recommendations of hand hygiene from 2009 show My 5 moments in practice when hand hygiene is mandatory [7]. Medical gloves are recommended to use:

1. To reduce the risk of contaminating the health workers' hands with blood and other body fluids.
2. To reduce the risk of spreading microorganisms

in the environment and the health worker transmitting them to the patient, and vice versa, as well as one patient, transmitting to another. Thus, the gloves must be used during all activities in taking care of the patients, and the contact with them, as precautions in situations of a source of infection.

Gacheva in 2008 shows the sequence of putting on and off the PPE, and also an algorithm to determine the necessity of it, according to the rate of risk. The scheme shows that if there's a risk of spraying, in case of an expected contact with body fluids, it ought to be estimated. At a lower risk, they just use gloves and an apron, whereas at higher risk – gloves, apron, a mask or a helmet. No PPE is needed if there's no expected contact with body fluids [8].

The aim of this study was to monitor activities that require hygiene of the hands and the use of PPE in a real hospital environment.

MATERIALS AND METHODS:

The research is held in May 2019 via a secretly structured monitoring in natural conditions at four wards in the University Hospital Kanev Ltd, Ruse, on randomly selected weekdays.

Activities that require hand hygiene and the use of gloves and PPE, and are performed by nurses, are being monitored and recorded in the following wards: Neurosurgery, Orthopedics and traumatology, Cardiology and invasive cardiology, and vascular neurology. A total of 320 (n) procedures of the nurse's daily activity are being monitored, which are connected to infections with both blood and body fluids, as well as the risk of looking after patients who are unable to look after themselves.

Hygienic handwashing, hand disinfection, the use of gloves, protective equipment, mask and glasses are all being studied in either taking blood samples, having contact with a patient, prior to performing aseptic procedures, bandage and wound treatments, and after contact with body fluids.

The current study also includes monitoring of adhering to the rules of hand hygiene and the use of gloves and PPE in hygienic care of the entirely helpless patients in changing bed linen, common hygienic dressing, oral hygiene, head washing, and dressing of genital and perianal area.

RESULTS:

The results from the accomplished monitoring in the different wards are shown in tables 1, 2, 3 and 4.

Table 1. Monitoring in performing standard activities and care in the ward of Neurosurgery

Activities and means of protection / Procedures	Number of the monitored procedures and activities (n)	Hygienic handwashing (n)	Hygienic hand disinfection (n)	Use of gloves (n)	Protective equipment (n)	PPE: Mask, glasses (n)
Risk of infection by blood and body fluids						
Blood samples taking	**11**	3	11	9	-	-
Before contacting a patient	**4**	1	1	4	-	-
After contacting a patient	**20**	12	20	13	-	-
After touching subjects from the patients' surroundings	**20**	15	20	5	-	-
Before performing an aseptic procedure (injections, infusions, punctures)	**17**	5	12	17	-	-
After contact with body fluids and blood	**20**	18	20	5	-	-
Bandage or treatment of wounds	**17**	3	13	17	-	-
Risk in care of patients who are unable to look after themselves						
Change of bed linen	**20**	3	16	20	-	-
General hygienic dress	**-**	-	-	-	-	-
Oral hygiene	**-**	-	-	-	-	-
Head washing	**-**	-	-	-	-	-
Dressing of genital and perianal area	**20**	-	18	20	-	-
Total number of activities: 149 (n)						

The observations are a total of 149 in the ward of Neurosurgery. According to the observation performed, it's clear that the bed linen change could only be connected to the toilet of genitals, without washing one's head, oral hygiene or doing common hygienic toilet. For all those activities, no safety clothing or PPE are used.

Table 2. Monitoring in performing standard activities and care in the ward of Orthopedics and traumatology.

Activities and means of protection / Procedures	Number of the monitored procedures and activities (n)	Hygienic handwashing (n)	Hygienic hand disinfection (n)	Use of gloves (n)	Protective equipment (n)	PPE: Mask, glasses (n)
Risk of infection by blood and body fluids						
Blood samples taking	**-**	-	-	-	-	-
Before contacting a patient	**25**	15	5	25	-	-
After contacting a patient	**5**	5	-	-	-	-
After touching subjects from the patients' surroundings	**-**	-	-	-	-	-
Before performing an aseptic procedure (injections, infusions, punctures)	**-**	-	-	-	-	-
After contact with body fluids and blood	**40**	35	15	40	-	-
Bandage or treatment of wounds	**-**	-	-	-	-	-
Risk in care of patients who are unable to look after themselves						
Change of bed linen	**-**	-	-	-	-	-
General hygienic dress	**-**	-	-	-	-	-
Oral hygiene	**-**	-	-	-	-	-
Head washing	**-**	-	-	-	-	-
Dressing of genital and perianal area	**-**	-	-	-	-	-
Total number of activities: 70 (n)						

Nurses in the ward of Orthopedics and traumatology do not always perform hygienic washing and disinfection of their hands before contact with the patient.

Table 3. Monitoring in performing standard activities and care in the ward of Cardiology and invasive cardiology

Activities and means of protection / Procedures	Number of the monitored procedures and activities (n)	Hygienic handwashing (n)	Hygienic hand disinfection (n)	Use of gloves (n)	Protective equipment (n)	PPE: Mask, glasses (n)
Risk of infection by blood and body fluids						
Blood samples taking	**10**	-	-	10	-	4
Before contacting a patient	**-**	-	-	-	-	-
After contacting a patient	**12**	12	6	-	-	-
After touching subjects from the patients' surroundings	**2**	-	2	-	-	-
Before performing an aseptic procedure (injections, infusions, punctures)	**8**	-	-	8	-	2
After contact with body fluids and blood	**14**	14	4	-	-	-
Bandage or treatment of wounds	**-**	-	-	-	-	-
Risk in care of patients who are unable to look after themselves						
Change of bed linen	**-**	-	-	-	-	-
General hygienic dress	**-**	-	-	-	-	-
Oral hygiene	**-**	-	-	-	-	-

Head washing	**-**	-	-	-	-	-
Dressing of genital and perianal area	**-**	-	-	-	-	-
Total number of activities: 46 (n)						

The results from the ward of Cardiology and invasive cardiology in regard to hygiene show exactly the same thing – no nurses are involved in those things, and there's no change of bed linen, oral hygiene or common hygienic toilet. The toilet of the genitals is performed only when needed for a hospital attendant to change a diaper.

The field use of PPE goes for a face mask, which is for just one nurse, and it's used during all her working shift (of 8 hours).

Table 4. Monitoring in performing standard activities and care in the ward of Vascular neurology

Activities and means of protection / Procedures	Number of the monitored procedures and activities (n)	Hygienic handwashing (n)	Hygienic hand disinfection (n)	Use of gloves (n)	Protective equipment (n)	PPE: Mask, glasses (n)
Risk of infection by blood and body fluids						
Blood samples taking	**10**	10	5	7	-	-
Before contacting a patient	**5**	5	2	4	-	-
After contacting a patient	**8**	8	7	1	-	-
After touching subjects from the patients' surroundings	**8**	8	5	1	-	-
Before performing an aseptic procedure (injections, infusions, punctures)	**5**	5	5	4	-	-
After contact with body fluids and blood	**11**	11	8	-	-	-
Bandage or treatment of wounds	**6**	6	1	3	-	-
Risk in care of patients who are unable to look after themselves						
Change of bed linen	**2**	1	1	2	-	-
General hygienic dress	**-**	-	-	-	-	-
Oral hygiene	**-**	-	-	-	-	-
Head washing	**-**	-	-	-	-	-
Dressing of genital and perianal area	**-**	-	-	-	-	-
Total number of activities: 55 (n)						

The results from the last monitored ward are no different. No hygienic disinfection is achieved after each contact with body fluids, and gloves aren't always used when there's a contamination contact expected.

DISCUSSION:

In monitoring the 149 activities in the Neurosurgery Department expected to be contaminated with blood and body fluids, the nurses don't always use gloves and also don't always disinfect their hands before aseptic procedures and when they bandage a wound.

Tsaneva and her team in 2017 perform their own research concerning the medical staff's hand hygiene and its adherence to the rules after introducing the multimodal strategy of WHO for doctors, nurses and hospital attendants. The research is held for a period of two months in 2014, via method – direct monitoring in the Multi-profile hospital Trakia of Stara Zagora. The authors have differed on some risk factors that obstruct good hand disinfection – wearing rings (jewelry) and long nails, most frequently observed in the nurse group.The highest degree of adherence to the rules is observed in nurses after fluid body exposure – 100% (48n), 94, 4% (17n) in hospital attendants, and 92, 6% (25n) in doctors. The contact with a patient is the next rate, where mostly the hospital attendants adhere to the rules – 100% (18n), followed by the nurses – 91, 7 (18n), and finally the doctors – 77,8 (21n) [9].

For this period, in the ward of Orthopedics and traumatology, it was possible to monitor just three of the daily activities and handwashing procedures – prior to and after contact with a patient and after contact with body fluids. It's clear from the results that in all three of them, gloves are used, but after contact with a patient, the nurses have just washed their hands. The effectiveness of the gloves for preventing contamination via the workers' hands is shown to decrease the transmission of pathogens. Nevertheless, the

gloves do not provide full protection against contamination. The hands' hygiene by rubbing an antibacterial fluid or washing remains the main activity and must also precede a contact always after the gloves are removed to guarantee decontamination.

In the ward of Cardiology and invasive cardiology, hygienic disinfection of hands isn't always done after contact with a patient and body fluids, furthermore without using any gloves, either. The health worker's competence in what moment he's supposed to put on the gloves and when to remove them is of utmost importance. The gloves are put on before a sterile procedure; in case of an expected contact with blood and body fluids, apart from the sterile conditions, including contact with unaffected skin and mucosa and contact with a patient and his close surroundings.

In Orthopedics and traumatology, no observations concerning hygienic care and bed linen change is filed since no nurse is being involved in them. When hygienic care is delegated to the support staff, the nurse may not receive adequate information [10].

CONCLUSIONS:

It can be stated as a general conclusion that the nurses do not follow the requirements of hand hygiene and the use of PPE. The goal of the current study was not about clarifying whether this is due to lack of knowledge for the cases that require the use of gloves and PPE, and when and how are hands washed.

Also, it's not determined whether the hospital has provided enough amount of antibacterial fluid, gloves and PPE. Whether the received data from the study are a result of the insufficient amount of antibacterial fluid, gloves and PPE, or just the nurses' non-compliance ' with the rules for prevention of HCAIs – this is a target of future researches. Nonetheless, the neglect of hand disinfection and the use of gloves and PPE threatens the health of both the nurses and patients, and it's one of the main preconditions for the occurrence of HCAIs.

Abbreviations:
HCAIs – Health care-associated infections
PPE – personal protective equipment
WHO – World Health Organization

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