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Citizen's feelings in connection with finding MRSA - a quantitative study

Bak Zeuthen, Anne

Background: Being found positive with MRSA is a challenge for an increasing number of people in Denmark and in the world. For the individual to have to live with a knowledge of being able to infect the closest family or others you are in close contact with can cause worries, anxiety ect.

Purpose: To find out whether the citizens who have been diagnosed with MRSA in the first quarter of 2020 experience emotions such as fear, worry or anxiety and whether it still worries them one year after receiving the diagnosis and whether the participants have been satisfied with the guidance provided by the Regional MRSA unit in Region Zealand.

Method: A quantitative study which by means of questionnaires was sent out to 70 included with a response percentage of 29%. In the study which was analyzed with descriptive statistics and Fishers Exact test and Chi 2 test was used to show if the answer was significant. Analysis of the non-responders was performed.

Results: A majority of citizens in the age group over 50 years experienced fear, anxiety and worry more than the younger part of the participants in the questionnaire survey. Women tended to be more affected in their everyday lives than men but there was no significant difference. There was no significant difference between the sexes as to whether they are concerned one year after the diagnosis was made. Likewise, the survey showed that a majority of citizens were very satisfied with the MRSA unit's guidance.

Conclusion: The feelings the citizens experienced in connection with being diagnosed with MRSA cannot be categorized or scheduled, they were individual and dependent on the conditions that the individual citizen has and the genders experiences it differently. These feelings must be taken into account when the citizen needs guidance on MRSA. It places great demands on the health professionals who need to inform about MRSA. Education/ guidance of health professionals and citizens is a very important tool here.

MESH Terms: MRSA, worries, anxiety, non-hospitalized.

Can flow, human factor engineering and nudging contribute to a safe process for doffing personal protective equipment? An intervention study conducted at Nordsjællands Hospital during the 1st and 2nd wave of the COVID-19 pandemic

Bjergegaard Gyrop, Helene

Background: In the beginning of the COVID pandemic, healthcare workers (HCW) in the front-line experienced fear and worried whether they were able to utilize personal protective equipment properly and safely or not. Several studies show the risk of HCW auto-contaminating in the doffing process. One way to reduce the risk of spread of infection is to establish a structural design of the doffing area.

Aim: To examine the staffs knowledge and compliance to the national guidelines for the use of protective equipment, the staffs attitude towards the implementation of a structural design of the doffing area and the staffs perception of ease and safety when doffing, before and after the intervention.

Method: The study consists of two cross-sectional studies. Data were collected before and after the restructuring of the design of the doffing area. Questionnaires were sent to personnel who have worked in the COVID ward before and after the intervention.

Results: After exclusions, a total of 80 and 118 responses were included in the final data set. The study showed that nearly all respondents thought they knew of and adhered to the guidelines of infection control. The staffs perceived increased ease after the intervention was statistically significant (p-value 0.004). Most of the staff found the design intuitive, easy to follow and supportive for a safe workflow for doffing. There was a non-significant tendency for the laboratory technicians not to share this assessment to the same extent as the other groups.

Conclusion: The study showed that flow, human factor engineering and nudging may contribute positively to staffs perception of safety during doffing. A structured design supports staff compliance with guidelines and contributes to a safe process for doffing. Implications: With limited financial resources it is possible to structure a design that can be adapted to local conditions for implementation.

The use of clean procedure in home health care nursing in connection with wound care.

Brun, Lene

Background: Prevention of infection is also important in the primary sector, where treatment has been relocated to the home of the citizens. A high degree of purity is required in connection with wound care to avoid wound infection.

Purpose: The purpose is to investigate if the use of clean procedure in home health care nursing in connection with wound care is sufficient to maintain a satisfactory degree of purity in boxes containing products for wound care.

Method: Dipslides were used for the screening of nine wound care boxes for the growth of bacteria over a period of 14 days. Samples were taken from the inside of each box as well as from 2 remedies. The samples were analysed for microbial growth and quantified as colony forming units/cm².

Results: In total, 63 samples in 9 wound care boxes were taken. None of the boxes had bacterial growth above 2.5 cfu/cm². In 15 of the samples there was sparse growth, of which the 13 samples with primarily apatogenic bacteria, which are found in the natural skin flora. There were no findings of gram-negative bacteria. Staphylococcus aureus was present in two samples. In one case the wound was characterized as infected and culture from the wound showed S. aureus. None of the other wounds had clinical signs of infection. The study also included 3 wound care boxes which have been used over a period of 3 month. One of these boxes was completely without growth, while the other two had modest growth. In a single sample, Clostridioides difficile was found.

Conclusion: All the wound care boxes which were examined met the microbiological requirements in relation to clean procedure. At first glance, it seems that current clinical practice is sufficient to maintain a satisfactory degree of purity in the boxes over time

Involvement of parents in adequate hand hygiene – how? Nurses- and mothers experiences. A qualitative study among parents and nurses in a neonatal ward.

Karen Dyhr Pedersen

Background: Hand hygiene is one of the most important single factors in preventing health-acquired infections. It is not clear to the hygiene organization, Hospital Unit Midt, Denmark, what efforts are being made locally to ensure that relatives are not sources of infection spreading through their hands.

Aim: The aim is to gain knowledge about how staff in a neonatal ward cooperate with and involve parents in promoting high hygienic standards in dealing with their children during hospitalization.

Method: A qualitative approach with ethnographically participating observations has been used. Based on the observations, 3 mothers and 3 nurses were interviewed. A thematic analysis has been carried out on the empirical evidence obtained.

Results: Nurses have high compliance for hand hygiene and consider themselves role models. The mothers report relatively safely when hand hygiene should be performed, despite this, parents generally perform hand hygiene as an unsafe procedure. Mothers see nurses as role models and see the absence of nurses in the patient room as a possible barrier to performing adequate hand hygiene. The COVID-19 pandemic has contributed to a higher awareness of hygiene in all.

Conclusions: If parents and relatives are to be more active in the child's care, it requires that efforts to disrupt routes of infection not only include the healthcare professionals, but also involve the children's parents and relatives to a greater extent.

COVID-19 contact tracing at the hospitals in North Denmark Region

Fromberg, Dorte

Introduction: The Infection Control Unit, Aalborg University Hospital has conducted contact tracing of all COVID-19 cases among patients and staff at the hospitals in the North Denmark Region. The aim was to evaluate the contact tracing and describe the number of cases, probable transmission sources, number of close contacts and how many of these were subsequently COVID19 positive.

Method: Data were collected from contact tracing reports done between May 14, 2020 – January 19, 2021. Data were anonymised but contained e.g. information about index case (patient/staff), probable source of transmission (community/hospital), number of close contacts (patients and/or staff) and how many of these who subsequently tested positive.

Results: A total of 262 contact tracing reports were conducted with identification of 454 COVID-19 cases; patients 132 (29%) and staff 322 (70.9%). There were 110 cases (37 patients and 73 staff) which tested positive in 'outbreak'-screenings. Thirty staff members were tested positive by systematic screenings. At the time of contact tracing, the proportion of asymptomatic cases was 201/454 (44.3%). The probable transmission source for patients and staff members were hospital acquired for 41 (31%) and 46 (14%), respectively; community acquired for 59 (45%) and 80 (25 %), respectively; and unknown for 32 (24%) and 196 (61%), respectively. A total of 1,370 close contacts was identified of which 1,175 were staff. Seventy (6%) were tested positive, and surprisingly, 31 were tested positive on day 0.

Conclusion: We identified 454 COVID-19 cases, each had an average of 3 close contacts. Only 6% of all close contacts subsequently tested positive and surprisingly, 44% of the positive close contacts were tested positive on day 0. We found a relatively high number of asymptomatic cases. COVID-19 testing is an important factor in identifying asymptomatic cases, and contact tracing remains important to prevent the spread of COVID-19 in hospitals.

New cleaning procedure increases the microbiological cleanliness in single patient rooms - a quasi-experimental study

Gerts, Tine

Background

Environmental cleaning is critical to prevent healthcare-associated infections. A new environmental cleaning lowered the daily cleaning quality but added a professional terminal cleaning process after patient discharge.

Aim

We investigated the difference between the previous and new environmental cleaning on frequently touched surfaces in single-patient rooms with private bathroom by examining the bioburden. For each cleaning procedure, two interventions were examined: Contamination of frequently touched surfaces while the patient was hospitalized up to 7 days and the bioburden before the next patient was hospitalized.

Method

The study was a prospective single-center quasi-experiment in which the previous cleaning procedure was used as the control group, and the new cleaning procedure was used in the intervention group. In a medical and surgical ward, samples were taken from frequently touched surfaces with microbiological contact plates. The primary outcome was colony forming units (CFU)/cm², and the difference between the two procedures was analyzed with a mixed effect model.

Result

While the patient was hospitalized, there was no significant difference in the contamination of the frequently touched surfaces between the cleaning procedures in either the medical or the surgical ward. The change in quality was not reflected in the level of contamination. Before a new patient was admitted, the bioburden was significantly lower after the new cleaning procedure OR=0.35 [95% CI 0.24-0.52] p <0.001.

The new cleaning procedure resulted in a lower number of CFU on the most frequently touched surfaces and a higher proportion of surfaces with less than 2.5 CFU/cm². (27% vs 71% after new cleaning procedure).

Conclusion

The new cleaning procedure lowered the bioburden without increasing the daily contamination at both the medical and surgical ward.

Change in resistance patterns of MRSA in wounds over time - a comparative cross-sectional study

Anna Hammarin

Background: Resistant bacteria, including methicillin-resistant *Staphylococcus aureus* (MRSA), is increasing worldwide. MRSA isolates are resistant to most beta-lactam antibiotics, making treatment options limited. They can also be susceptible to or resistant to other staphylococcal antibiotics such as clindamycin, trimethoprim-sulfa, fucidic acid and gentamicin.

Aim: The aim of this study is to investigate if and how the non-betalactam antibiotic resistance levels for MRSA in human wounds has changed over time in the Stockholm region by comparing the years 2010, 2015 and 2020, and to find out if it is possible to see a connection between resistance patterns and other factors.

Methods: It's a cross-sectional study to investigate whether and how the resistance pattern for MRSA in wounds has changed over time in patients in the Stockholm Region and whether there is a connection with other factors such as age, gender, domestic or foreign infection.

Results: The resistance to gentamicin had increased from 6.9% to 21.7% between 2010 and 2020, which was significant. For clindamycin, the levels increased slightly from already high levels, but no significant increase was seen. Trimethoprim sulfa showed lower resistance levels in 2020 than in 2010, low levels in both years. The fucidic acid resistance levels were highest in 2015, but no significant difference was seen except for men between 2015 and 2020. Spa type t005 was the most common spa type in 2020 and was not detected at all in 2010. All isolates with spa type t005 in 2020 were gentamicin resistant.

Conclusion: The levels of clindamycin and fucidic acid resistance have been quite high throughout the whole observation period, while the gentamicin resistance levels have increased. Resistance levels to trimethoprim sulfa have been low the whole period. Implications: Trimethoprim-sulfa is a good empirical treatment option for skin and soft tissue infections caused by MRSA.

Keywords: MRSA, antibiotic resistance, resistance patterns, wounds, treatment

Compliance with basic hygiene procedures in animal health care and how self-inspection affects compliance

Kamaterou, Charlotta

Introduction: Preventive work to limit the spread of infection in animal health care is important from several aspects, not least to prevent antibiotic resistance. Basic hygiene procedures like hand hygiene are fundamental in this work. However, knowledge about compliance and factors that affect compliance in animal health care is lacking due to limited research.

Aim: To examine how compliance with basic hygiene procedures is affected by if and how self-inspection regarding basic hygiene procedures is being performed. Further, to examine whether there are differences in compliance between e.g. different occupational groups.

Material and methods: Veterinary clinics with small animal and/or equine care performed observations of the staff's compliance with basic hygiene procedures and answered a questionnaire mainly about self-inspection.

Results: Only two clinics participated in the study. The amount of data collected was therefore limited. The mean compliance with all hygiene variables observed was 79 % (95 % CI 72-85). The variables with the lowest compliance were hand hygiene procedures. Of the 19 persons observed, 5 respectively 3 performed correct hand hygiene before respectively after patient contact. There was no significant difference in compliance between veterinarians and veterinary assistants ($p=0.42$).

Conclusion: Compliance with hand hygiene procedures was low. There was no significant difference between different occupational groups. Due to limited amount of data, the study could not evaluate how self-inspection affects compliance with basic hygiene procedures.

Implications: The study indicates that it is a challenge to recruit participants for this kind of study and that there may be a need for a more engaging recruitment method than distributing an invitation with instructions. The low adherence to hand hygiene procedures indicates the need of increased focus on infection prevention and control in animal health care and the need of more studies to increase knowledge about factors that affect compliance.

The effect on reassessment of urinary catheter after implementation of an electronic reminder in an Emergency Department

Ladegaard, Trine

Introduction: Urinary tract infections are one of the most common hospital acquired infections. The incidence in Denmark, during 2020, was 36.34/10.000 risk days, while the incidence at the university hospital was considerably higher at 60.41/10.000 risk days. Hospital acquired urinary tract infections are associated with use and prolonged use of urinary catheter. This forms the basis for the project carried out at an Emergency Department (ED).

Research question: What effect does the implementation and use of a virtual electronic tool, for the visibility of acquired urinary catheter have on the reassessment of urinary catheter and on the proportion of patients with remaining urinary catheter at transfer from ED?

Materials and methods: A quantitative, non-randomized intervention study. The implementation of the virtual tool took place over 3 weeks in March 2021 with daily teaching sessions and supervision. Data collection from patient records was performed during an 8-day period before and after the intervention. The proportion of patients with remaining urinary catheters and inconsistent documentation was registered.

Results: In total 537 patients were included, 281 before and 256 after the intervention.

Sixteen percent of the patients were transferred from ED with urinary catheter, while this figure was 13.3% after the intervention. The difference was not statistically significant (relative risk[RR] 0.83, 95% confidence interval[CI]: [0.55-1.25],P=0.37).

The proportion of inconsistent documentation practices was 13.9% before, 5.8% after the intervention (RR 0.42, 95% CI: [0.24-0.75],P=0.002).

Conclusion: Implementation of a virtual electronic tool gave a statistically significant reduction in inconsistent documentation, and thus visibility of patients with urinary catheter, transferred from ED but the difference in the proportion of patients with remaining urinary catheter, was not statistically significant.

Implications: Improved documentation practice makes visible the indication for urinary catheter, which enables reassessment, removal and thus prevention of urinary tract infections in the hospital as a whole.

The Vancomycin-resistant *Enterococcus Faecium* outbreak in the Faroe Islands in 2015

Lambaa, Lena

Background: The first outbreak at the National Hospital in the Faroe Islands with a multidrug resistant bacterium was in the spring of 2015. Vancomycin-resistant *Enterococcus faecium* (VRE) were isolated from clinical samples. The source of this outbreak were the hospitals in Copenhagen, Denmark.

Aim: To describe the incidence of VRE in the observation period 2015-2020. To investigate possible associations between infection control measures implemented, the development of the VRE outbreak, and the VRE incidence.

Methods: Raw data on VRE findings were available from the microbiology laboratory. Incidence of VRE cases is reported, for the period 2015-2020. With descriptive epidemiological methods, possible associations between the development of the VRE outbreak and the chosen infection control strategies, were investigated. The outbreak and its timeline were described with help from mail correspondences and other written sources from the handling of the outbreak

Results: Infection control interventions implemented in 2015 did not eradicate VRE. VRE was declared endemic in the Faroe Islands in February 2016, and there after general infection control measures were prioritized combined with screening for multidrug resistant bacteria in patients arriving to Faroese hospitals. Over the years, reduced numbers of patients have tested positive for VRE carrier status in routine screening from hospitals abroad. However, increasing numbers of patients have until 2020 tested positive for VRE in clinical samples.

Conclusion: Our data indicate that patients arriving from Denmark now are not re-introducing VRE to the Faroe Islands. However, VRE has not disappeared among Faroese clinical isolates indicating a VRE reservoir in the Faroe Islands. The numbers in the Faroese VRE data are small and the data and fluctuations from year to year must be interpreted cautiously. The risk for bias introduction is present because of the nature of the data and relatively small numbers in the data set. However, the numbers must be interpreted in the context of a small country with a small number of inhabitants.

Implications: Handling and prevention of healthcare associated infections should be prioritized in the Faroese Healthcare System, both in nursing and treatment. Environmental factors as infection sources should also be in focus.

Do socio-economic factors contribute to the spread of MRSA? - A systematic review.

Lydiksen, Else B.

Background: The presence of community-acquired methicillin-resistant *Staphylococcus aureus*

(MRSA) has increased in recent decades. The association between socioeconomic factors and the spread of MRSA has not been previously elucidated in a literature review.

Objective: To examine and elucidate whether the spread of MRSA in certain populations in high-income western countries are related to socioeconomic factors.

Method: Studies were searched systematically in the PubMed, Embase and CINAHL databases. Articles that investigated the association of MRSA with income, education level and housing conditions were included. Information was thematically extracted about study aims, methodology, results and conclusions. The quality of the studies was systematically assessed using critical appraisal checklists. The quality of the overall evidence was evaluated using GRADE.

Results: Ten articles from the period 2013 to 2019 were included. Of these, 4 were cross-sectional, 4 case-control and 2 were cohort studies. Results of the studies were categorized into the following areas; living in deprived areas, income, education and housing conditions. All studies found an association between socioeconomic factors and the rate of MRSA. Increased MRSA was associated with low income, crowding or living in areas with low socioeconomic status. The impact of education level was less clear. Due to the limited number of included studies and the quality of the studies, the overall evidence had to be considered low.

Conclusion: The results indicate inequality in the MRSA rate among groups with different socioeconomic status, but based on the quality of the studies, the association could not be assessed with adequate certainty.

Implications: The fact that all the studies showed a possible association indicates that it is relevant to investigate the area further to increase professional knowledge and thereby highlight possibilities for preventing the spread of MRSA in different socioeconomic groups.

Nudging as a method to improve hand hygiene compliance?

Lyngby Petersen, Trine

Introduction: Hand hygiene is the most important method of interrupting transmission routes. Methods used today to increase the hand hygiene of health care workers are traditional teaching. However, the spread of infection continues to and challenge patient safety. Nudging is a new tool for behavioral regulation, but knowledge of the method's effectiveness in infection prevention and control is deficient.

Aim: To examine whether nudging, can increase hand hygiene compliance measured against conventional pedagogical teaching.

Materials and Methods: Observation study in two medical departments with observation periods before and after intervention - one with nudging and one with pedagogical teaching. Measuring points for proper hand hygiene consist of modified WHO criteria.

Results: Nudging and teaching resulted in trend towards improved hand hygiene as a percentage in 4 out of 5 and 1 out of 5 critical situations, albeit the result were not significant. When used nudging the trend shows the largest percentage improvement, after physical contact with a patient or physical contact with the patient's surroundings; whereas the critical situation is where when one leaves after having touched something unclean, had a decrease of 12 %. Teaching showed improvement in hand hygiene of modest size. Regardless of intervention, overcrowding and busyness seemed to challenge compliance with hand hygiene recommendations.

Conclusion: Nudging tended to increase the compliance with hand hygiene, but results were not unique. Since nudging promotes intuitive actions, this capability may not be available when, due to busyness, the focus is on solving urgent tasks. There were no convincing results for conventional teaching.

Implications: Nudging seems to be a useful tool to improve hand hygiene culture, possibly if combined with other hygiene measures. To elucidate on the applicability of nudging in infection prevention and control, there is need to for additional studies.

Healthcare workers perception and handling of infection control and risk of transmission in a neonatal ward – a qualitative study

Lüttichau-Holm, Linda

Background: Between 2011 and 2020, 22 MRSA outbreaks occurred, in neonatal wards in Denmark, with a total of 411 infected persons. Outbreaks can be prevented by strict compliance with standard hygiene precautions. This study focuses on behavior and influencing factors, around hygiene precautions, in relation to the neonatal population.

Aim: The study aims to explore and describe how nurses perceive and handle infection control in a neonatal ward and to identify factors influencing compliance with hygiene precautions and infection control.

Method: In this qualitative study, data was collected by five semi-structured interviews of neonatal nurses from the same neonatal ward. Thematic networks analysis and Nvivo computer assisted qualitative data analysis was used for conducting the analysis.

Results: Neonatal specific conditions affect nurses' focus on and compliance with hygiene precautions and infection control. Specific conditions include fragility of the neonatal population, clinical condition and parents' changing needs for support during the hospital stay. Parents are very involved in childcare. Nurses focus on, supporting parents in participating in care and decision making as well as continuous instructions to hygiene precautions. Large behavioral variations were identified among nurses, based on individual perception/assessment of risk of transmission and infection control, and intensity in workload. Focus on implementing standard hygiene precautions and developing local procedural guidelines can contribute to improved compliance. Furthermore, the role of the link nurse around learning and competence development, is crucial.

Conclusion: Knowledge, behavior and focus on hygiene precautions and guidelines is subject to great variation among neonatal nurses. Implementation of standard and procedural guidelines, including the role of the link nurse is of great importance, in hygiene compliance.

Impact: Increased effort towards development of skills and competence of nurses and parents, can contribute to improved compliance with hygiene precautions and, thereby prevent health care associated infections and outbreaks in neonatal ward.

Socio-economic characteristics impact on covid-19 mortality in region Västra Götaland.

Mellström Dahlgren, Henrik

Background: There is a well establish association between low socio-economic status and health outcomes in general. To mitigate the impact of covid-19 there is a need to identify vulnerable groups, and to create methods that can do that in real-time as the virus-spread progress in the society.

Aim: To examine if there are differences in mortality between different DeSO-areas in Västra Götaland according to these areas socio-economic characteristics. The second aim was to examine if DeSO-areas can be used in surveillance purpose and which variables that are relevant in that case.

Materials and methods: Confirmed covid-19 case in region Västra Götaland between 26th February 2020 and 18th April 2021 was linked to different residential socio-economic characteristics (quintiles of income, low education, foreign born and categories of population density) based on Demographic Statistics Area (DeSO) data.

Results: Older age and male sex was associated with covid-19 mortality. Income-level was the only of the DeSO variables that remained significant through the fully adjusted model. Living in areas in the lowest income quintile was associated with increased covid-19 mortality (hazard ratio: 1.83; 95 CI 1,358 - 2,467) compared to those that lives in the area within the highest income quintile.

Conclusion: Living in a low-income area is associated with an increased risk of death in covid-19. This DeSo variable capture the socio-economic factors that is associated with covid-19 mortality on an aggregated level. The results are in accordance to other studies based on individual-level data suggesting that aggregated information from DeSO-areas are useful and relevant to identify vulnerable groups for covid-19. Linking cases to DeSO-data can give better keys to understand the progress of the virus-spread in the society.

Implications: To emphasize the importance that covid-19 vaccination and other protective measures like testing and contact tracing are accessible irrespective of barriers that comes with social inequalities and deprivation. The Swedish surveillance system for notifiable diseases should be linked to socio-economic data.

Compliance with basic hygiene routines and Healthcare Associated Infections in the Norrbotten Region the pandemic year 2020 compared with 2019

Näslund Anda, Mia

Background: Ensuring knowledge of how to prevent the spread of infection and increase adherence to basic hygiene routines is important for health care. This has been further actualized by the ongoing Corona pandemic.

Aim: To compare point prevalence measurements and marker-based data regarding care-related infections and compliance with basic hygiene routines from the pandemic year 2020 with the normal year 2019.

Method: The study had a retrospective descriptive design with data from completed marker-based journal reviews and point prevalence measurements in the Norrbotten Region for 2020 and 2019.

Results: The results for compliance with basic hygiene routines showed a significant increase in compliance with clothing rules, hygiene rules and the measure "correct in all steps" during the pandemic year. The point prevalence measurements regarding the care-related infections did not show a significant increase during the pandemic year. The types of healthcare-associated infections showed no significant difference between the years. However, there was a statistically significant increased number of patients with residual urinary catheters and the patients were younger during the pandemic year.

Conclusion: During the pandemic year, increased compliance with basic hygiene rules was demonstrated. No significant difference was detected in the prevalence of health care associated infections.

Handling of protective equipment - Experience of own practice as a risk factor for the spread of infection. A qualitative study among hospitals nurses

Pedersen, Janne

Background:

Healthcare professionals (HCP) use protective equipment with the intention to prevent and reduce transmission of infection. According to the literature HCP possess a risk to themselves and their surroundings when removing protective equipment. However, there is a lack of knowledge about HCP's own perception of this risk, and which barriers the staff experience in handling protective equipment correctly in a Scandinavian context.

Aim:

The purpose is to investigate how hospital nurses experience the risk of self-contamination when using protective equipment. The purpose is also to explore the nurses' experiences in relation to contextual factors that might influence the handling of protective equipment.

Method:

In this qualitative study, semi-structured interviews were used. Nine nurses from two medical departments were interviewed. The empirical material was analyzed by using a thematic network analysis.

Results:

The study shows that it is important for the nurses to have good habits. The habits may be based on the guidelines, but it is stated and accepted that the habits do not necessarily follow these. During the COVID-19 pandemic, attention has been focused on errors and shortcomings in the handling of protective equipment, but a greater understanding of the risk to infect oneself and others has been established. It is seen that several nurses cannot express their knowledge of why they do as they do, and the focus on the protective equipment is about how the handling takes place rather than why. Barriers for proper handling of protective equipment are experienced when working alone, as colleagues are used for sparring, and can also promote that one makes a greater effort. Despite perceived uncertainty, the nurses have not requested practical training in the department.

Conclusion:

The study shows that the composition of nurses and their experience, are crucial for the proper handling of protective equipment in the department. The tacit knowledge which the experienced nurses possess has great value, but it cannot remain silent, if the level of the combination of practice and theory is to be raised and be an ongoing point of focus.

Key words:

Organization, microbiology, infection control, barriers, risk concepts, protective equipment, the good habits, the tacit knowledge.

Carbapenemase Producing Enterobacteriaceae - screening and contact tracing in Region Stockholm in comparison with two other Swedish regions

Pergert, Mats

Background: Carbapenemase Producing Enterobacteriaceae (CPE) is a growing problem all around the world. Sweden is relatively spared and there are very seldom outbreaks within the health care sector. Region Stockholm does contact tracing on all new and known carriers of CPE in health care institutions while other regions test only those who share room and toilet.

Aim: Is the CPE contact tracing strategy in Region Stockholm more effective in finding patients with a nosocomial spread than in Region Västra Götaland and Region Skåne who has less meticulous contact tracing strategies?

Materials and methods: Contact tracing and screening data were collected from the Karolinska University Laboratory for the years 2018 – 2020 and corresponding data were asked for from Region Västra Götaland and Region Skåne. Descriptive data were analyzed in Excel.

Results: During the study period the Karolinska University Laboratory handled 23,862 contact tracing tests. Of 288 samples from 169 patients who turned out positive for CPE in screening, bacterial culture and contact tracing altogether, 65 samples (49 patients) turned out positive from contact tracing. Four patients were traced to have the same strain as the index and were considered infected within the health care sector. Region Västra Götaland discovered 6 patients and Skåne 2 patients, respectively, who were infected within the health care sector during the same time.

Conclusions: There was an enormous number of contact tracing tests for CPE performed in Region Stockholm. Only four patients turned out to be infected within the health care sector. They would have been discovered by using the close contact tracing and screening in the same way as they do in Region Västra Götaland and Region Skåne.

Implications: Based on the findings it could be argued that it would be enough to perform contact tracing on patients who have shared the same room or toilet with a newly diagnosed CPE carrier. There seem to be no reason to test patients when a known carrier is admitted to a ward since the index will have a single room and staff will be aware of the situation.

How to remove *Clostridioides difficile* from the hospital environment? A systematic literature study

Sakserud, Anne Hilde

Introduction: *Clostridioides difficile* is a spore forming bacteria that can cause disease of varying severity, from mild diarrhea to pseudomembranous colitis and death. The bacteria is a known cause of healthcare associated infection across the world. *Clostridioides difficile* survive long in the environment and trace agents are used to neutralize them.

Aim: The purpose of the thesis is to find the means and methods available for cleaning and disinfection of *Clostridioides difficile* in a hospital environment. With the sub-goal to reduce the incidence of microbes, which can reduce the possibility of disease and carriers in patients, visitors and staff.

Method: Systematic literature study, not comprehensive. The search were performed in the PubMed database. Peer-reviewed English-language, original articles from 2015-2021, with abstract, were included. Quality assessment by the GRADE (Grading of Recommendations Assessments, Development and Evaluation). Key words: *Clostridium difficile*, *Clostridioides difficile*, cleaning, disinfectant and environment. Eight articles included.

Results: Disinfection was describe by use of hydrogenperoxid, ultraviolet radiation and Photocatalytic reactor as automated methods, and with sodium dichloroisocyanurate and sodium hypochlorite as manual methods. By automated methods, the results is affected by, for example, shadow areas, soil and location of the equipment. In the case of manual methods, the working time and concentration of the disinfectant is important. Most methods shows a reduction in the incidence of *Clostridioides difficile*. Different measuring points and measuring units does it difficult to make a direct comparison between the included articles. There is need for manual cleaning before disinfection.

Conclusion and Implications: It is important to have the correct location of the equipment at automated disinfection. It is important to use enough disinfectant with the right strength and enough time for manual methods. Further studies from the hospital environment are needed around the methods. The results can be used in further work.

Nosocomial bacterial infections as a consequence of endoscopic investigation

Skovbjerg, Maria

Background: Flexible endoscopes are complex reusable devices with varying numbers of long thin channels, comprised of different materials. Due to their complexity, endoscopes are difficult to reprocess, therefore contamination can occur despite well-implemented reprocessing procedures. It is generally considered, that the risk of infection arising from endoscopy is relatively small, but there are studies that document both infections and pseudo-infections.

Objective: To identify evidence for nosocomial infections occurring due to endoscopic investigation. The search was limited to bacterial exogenous infections, transmission conditions and measures to prevent infection transmission. The purpose of the study was to find infection risks that may occur when using contaminated endoscopes and to identify measures to reduce that risk.

Material and method: The research question was addressed by a systematic literature study. A search strategy was developed and the search was performed in Pubmed, Embase and Web of science. Results: The systematic review included 20 studies. The most common bacteria that cause infection / pseudoinfection are *Pseudomonas aeruginosa* and other *Pseudomonas* spp., *Mycobacterium* spp. including *Mycobacterium tuberculosis*, *Stenotrophomonas maltophilia* and *Burkholderia cepacia*. Most outbreaks resulted from inadequate reprocessing or defective flexible endoscopes. Less frequently, contamination occurred via endoscope washing machines, from the environment, and from improper handling. Measures to prevent infection transmission include improving the reprocessing procedure, using procedures that ensure earlier identification of defective endoscopes, maintaining the endoscope washing machines and monitoring via water samples from both the endoscopes and the endoscope washing machines. In addition, there were studies that recommended the use of sterilization or single use endoscopes.

Conclusions: The results indicated that contaminated endoscopes can cause both infections and pseudo-infections, but the correct incidence has not been accurately calculated due to apparent underreporting. The level of evidence for the included studies was low, highlighting the need for further research in the field.

Prevalence surveys of healthcare-acquired infections and antibiotic use in nursing homes – time for change?

Wikan, Nina Alette

Background: Healthcare-associated infections (HCAI) in nursing homes burden residents and involve the use of antibiotics, a resource that must be managed wisely for the future. Urinary tract infections (UTI) are the most common HCAI in nursing homes and antibiotics for this indication are the most commonly used. In Norway, HCAI and antibiotic usage are monitored in the national prevalence monitoring NOIS-PIAH. Monitoring is a prerequisite for influencing the incidence of HCAI and antibiotic use. The nursing homes' participation in prevalence monitoring is deficient despite being mandatory.

Aim: To evaluate the prevalence of HCAI, of antibiotic usage and participation in prevalence monitoring in nursing homes in three municipalities in Finnmark; Alta, Hammerfest and Sør-Varanger.

Materials and methods: NOIS-PIAH data for HCAI and antibiotic use in the period 2017-2019, a total of 6 measurement points, for three municipalities in Finnmark, were obtained from the National Institute of Public Health. Participation was mapped, and prevalence of HCAI and antibiotic use compared between municipalities and over time.

Results: Participation in the prevalence surveys varied between municipalities from full participation to no participation at the measuring points. Prevalence of HCAI-UTI varied between 0-20% and prevalence of antibiotic use between 0-22%, similar to national figures. No difference was found in the prevalence of HCAI-UTI between municipalities and over time. Antibiotic use declined over time, due to high consumption of methenamine in one of the municipalities at the start of the observation period.

Conclusion: During 2017-2019 the prevalence of HCAI-UTI in nursing homes in the observed municipalities is stable. Antibiotic use has decreased. Participation at NOIS-PIAH in nursing homes in Finnmark is deficient, which affects the credibility of the results, and indicates that the nursing homes see limited benefit from participating in the prevalence monitoring.

Implications: A different system for monitoring HCAI might be more useful.

Self-assessed knowledge about pneumococcal vaccine among nurses with or without authorization to prescribe pneumococcal vaccine, and with different length of vaccination experience.

Woxén, Veronica

Background: Nurses with or without authorization to prescribe pneumococcal vaccine need advice and support in vaccination issues. This survey examined whether the self-assessed knowledge about pneumococcal vaccine was higher for nurses authorized to prescribe pneumococcal vaccine than for nurses without authorization. In addition, the self-rated knowledge between nurses with five years of vaccination experience or less was compared with those with more than five years, regardless of education.

Specific objectives: To investigate possible differences in self-rated knowledge regarding pneumococcal vaccine amongst nurses who vaccinate at GP's in the Stockholm Region based on:

- 1) Education (nurses with the right to prescribe vs nurses without the right to prescribe pneumococcal vaccine).
- 2) Vaccination experience, measured in number of years, regardless of further education.

Materials and methods: Through a web-based questionnaire, this cross-sectional survey examined the respondents' self-assessed knowledge about pneumococcal vaccine. The questionnaire was sent via e-mail to 158 GP's in the Stockholm Region and was answered by 334 nurses. Results: Nurses authorized to prescribe pneumococcal vaccine had a tendency towards higher self-rated knowledge than unauthorized nurses, but the difference did not reach statistical significance in the questions about vaccine structure and function and not in what order and at what intervals to use for those recommended both types of vaccine. Nurses, regardless of education, with more than five years of experience had statistically significantly higher self-rated knowledge in all matters.

Conclusion: This study showed that vaccination experience is more crucial than education for high self-esteem knowledge of pneumococcal vaccine, but education was also significant.

Significance: In the long run, an online training with a knowledge test on pneumococcal vaccine would be an opportunity for nurses to get updated knowledge about current recommendations. In addition, it would be a good basis for business managers to assess whether a nurse has the equivalent of training as a district nurse or a nurse with specialist education in health care for children and adolescents and thus is authorized to prescribe pneumococcal vaccines.