

2022 Abstracts

Degree Project in 1 year Master programme in medical microbiology, with specialization in infection prevention and control, 15 hp

Institute of Biomedicine, Sahlgrenska Academy, University of Gothenburg

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Prevention of Carbapenemase-producing Enterobacteriaceae (CPE) transmission in the Danish health care sector: Who should be screened for CPE and when? A systematic literature study.

Degree Project in one-year Master programme in medical microbiology, with specialization in infection prevention and control, 15 hp.

Mette Bar Ilan, 2022.

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Abstract

Background

Carbapenemase-producing Enterobacteriaceae (CPE) cases increases every year in Denmark and the proportion of CPE positive cases with a travel history decreases. Several epidemiological links are found in the healthcare settings reflecting infection prevention and control (IPC) challenges and raising questions about whether the Danish screening tool identifies the right patients at the right time to timely establish relevant IPC measures.

Aim

To identify additional risk factors than described in the Danish CPE screening protocol in order to detect the Danish CPE positive patients and thereby reduce the risk of transmission and outbreaks.

Methods

A systematic literature search was conducted in PubMed, Embase and Cochrane Library during March 2022. Retrieved studies dealt with patients with laboratory confirmed CPE (colonization and/or infection) and associated risk factors with the aim to identify CPE colonized and/or infected patients and thereby prevent transmission and outbreaks. A systematic review was performed, and a selected group of studies providing knowledge of significant CPE risk factors in different countries with generalizable results were included.

Results

Nineteen studies were included. Antimicrobial therapy, especially broad-spectrum antibiotics, prior or current hospitalization and especially long hospitalization, travel history with or without hospitalization abroad were significant risk factors associated with CPE acquisition. Furthermore, comorbidities and invasive procedures were identified as risk factors for CPE acquisition, but without the possibility to identify specific comorbidities or invasive procedures associated with risk for CPE colonization and/or infection.

Conclusion

The results from this literature study can provide supplemental knowledge for developing a new additional algorithm for CPE screening of Danish inpatients and suggest further research.

Implications

This systematic literature review may be used as a supplement when revising the current Danish CPE screening protocol.

Degree Project in 1 year Master program in medical microbiology, with specialization in infection prevention and control, 15 hp.

A systematic review of which surveillance method detects, at the earliest time, the highest proportion of asymptomatic Methicillin resistant Staphylococcus aureus carriers among newborn premature and mature infants admitted to a neonatal intensive care unit.

Rikke Bjolde Nielsen, 2022, Institution of biomedicine, Sahlgrenska academy, University of Gothenburg.

Abstract

Introduction: An immature immune system, especially in premature infants, increases the susceptibility to Methicillin-resistant Staphylococcus aureus (MRSA) colonization and infection. Surveillance cultures are used to identify MRSA carriers and prevent the spread in neonatal intensive care units. There is a lack of knowledge regarding which body sites should be sampled for optimal detection, if surveillance cultures, on the day of birth, detect MRSA, and whether routine surveillance identify more carriers.

Aim: To investigate which surveillance method detects, at the earliest time, the highest proportion of asymptomatic MRSA carriers among newborn premature and mature infants admitted to neonatal intensive care units.

Materials and methods: A systematic literature search in PubMed, EMBASE and Cochrane Library was conducted, and studies were selected based on predefined criteria. From the included studies, data of relevance for the research questions were extracted, e.g. criteria, time and frequency for surveillance culture, and body sites cultured. The quality of the studies was assessed with the Method for Evaluating Research and Guideline Evidence.

Results: Seven prospective and three retrospective observational studies met the inclusion criteria. Three studies indicated that sampling from umbilicus may contribute to the detection of MRSA carriers, and one study indicated that sampling the pharynx may overlook MRSA carriers. Three studies indicated that there is an exposure risk during childbirth, if the mother is MRSA positive. Five studies indicated that universal surveillance and routine surveillance may reduce the risk of colonization. The quality of the included studies was assessed to be low to very low, which reduced the strength of the results.

Conclusion: The results may be used to emphasize the relevance for further investigation of these areas in Denmark.

Implications: This report may be used to emphasize the relevance for further investigation in more details, before the next revision of the Danish national MRSA guideline.

Examensarbete för 1-årig Magisterutbildning i medicinsk mikrobiologi, med inriktning mot smittskydd och vårdhygien, 15 hp

Outbreak of *Pseudomonas aeruginosa* in an Intensive Care Unit at The University Hospital of North Norway: descriptive epidemiology and investigation

Tina Bogetvedt, 2022, institutionen för biomedicin, Sahlgrenska akademien, Göteborgs universitet

Abstract

Introduction: Three patients in an Intensive Care Unit at the University Hospital of North Norway were infected with a novel sequence type ST3875 of *Pseudomonas aeruginosa*. The patients had severe covid-19, and died of bloodstream infections. A local outbreak investigation was initiated and infection control measures were taken to limit the outbreak. Cases were later reported in several Norwegian hospitals. Eventually, the outbreak strain was identified in non-sterile pre-moistened disposable washcloths.

Aim: To describe the outbreak and the local investigation conducted during the first period, before cases at other hospitals were identified. The second aim is to acquire knowledge to prevent future outbreaks.

Materials and methods: Data collection, concerning three index cases and five suspected cases, included journal examination, microbiological analyses and field observations. Descriptive epidemiology led to hypotheses, which were tested.

Results: In November 2021 (week 46), the outbreak was reported to the Norwegian Institute of Public Health, who replied that no similar cases were noticed in other hospitals. Consequently, this led to a local focus on transmission. During the first 4-5 weeks, only three cases were confirmed by genomic analysis, and a dynamic investigation process conceded. In December 2021 (week 51), Whole Genome Sequencing (WGS) confirmed five new cases. Three of these were admitted at other hospitals in Northern Norway. The focus turned towards an external, common source, and a regional investigation began.

Conclusion: The local response led to the discovery of a large nationwide outbreak. In addition to epidemiological methods, genomic analysis was useful. The lack of validated methods for environmental samples was a weakness. Response systems can be continually improved for effective outbreak investigations.

Implications: A reminder of the risk of infection in intensive care patients, hence the importance of infection control measures. Environmental sampling and genomic analysis are useful in outbreak investigations.

Abstract

Degree Project: 1-year Master programme in medical microbiology, with specialization in infection prevention and control, 15 hp
Title: Outbreaks of carbapenemase-producing organisms in the North Denmark Region from 2012 to 2022 with a possible connection to the hospital environment
Author: Hanne Donskov Eriksen Institution of biomedicine, SAHLGRENSKA AKADEMY, University of Gothenburg, Sweden 2022
<p>Introduction: Exposure to Carbapenemase-producing organisms (CPOs) is an increasing problem for hospitalized patients and healthcare in general. The North Denmark Region has had a persistent outbreak since 2012 with <i>bla</i>NDM-1 <i>Citrobacter freundii</i> ST18 at the Hematology Ward and the Abdominal Surgical Ward, Aalborg University Hospital (AAUH)</p> <p>The aim of the study was to characterize the occurrence of CPO in environment from two wards with outbreaks, assess environmental remediation of CPO at Hematology Ward, to compare the occurrence of CPO in the environment on a section with remediation of the environment versus no measures, and to investigate whether transmission routes can be verified by comparing whole-genome sequencing data from toilets and patients.</p> <p>Materials and methods: In addition to clinical and screening samples from patients, environmental samples were taken from drains and toilets, in totally from four wards, two wards with outbreaks and two wards as control were examined for CPO. At the Hematology Ward, toilets were disinfected with peracetic acid at a concentration of first 2500 ppm (period 1) and then 5000 ppm (period 2). At Abdominal Surgical Ward, isolates from toilets, drains and patients in the period from 2021 to March 2022 were examined by whole-genome sequencing and analysis for sequence similarity and strain identification.</p> <p>Results: <i>Citrobacter freundii</i> ST18 <i>bla</i>NDM-1 strain was found in toilets and drains on the two wards with known outbreaks. In addition, the outbreak strain was found on a smaller scale in the toilets on the two control wards. At the Hematology Ward, the prevalence in toilets before disinfection was 67% and 80% and 78% in periods 1 and 2, respectively. The prevalence rate ratio was resp. 0.83 (CI95% 0.55-1.26) and 0.84 (CI95% 0.56-1.28) in the two periods. Using whole-genome sequencing, the genetically identical bacterium was detected in samples from both toilets and patients.</p> <p>Conclusion: Whole-genome sequencing verified that the strain found in toilets and drains was identical to the <i>Citrobacter freundii</i> ST18 <i>bla</i>NDM-1 strain previously found in 57 patients of Region North Denmark. There was a higher incidence of CPO in drains and toilets on the two wards with outbreaks than on the two control wards. The intervention showed no significant effect on the incidence of CPO in the toilets, therefore it has not been possible to compare decontamination versus existing cleaning. Based on whole-genome sequencing, it is assumed that two patients were infected with CPO via the toilet in the room where they had stayed.</p>

Degree Project in 1 year Master programme in medical microbiology, with specialization in infection prevention and control, 15 hp

SARS-CoV-2 infections and COVID-19 associated deaths among elderly and long-term care facility residents in Norway: *Variation in incidence rates and risk through the COVID-19 pandemic. A cohort study.*

Liz Ertzeid Ødeskaug, 2022

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Abstract

Background

The major burden of the COVID-19 pandemic has been among the elderly and residents in nursing homes. Multiple factors have influenced the incidence rates and risk of SARS CoV-2 infections and COVID-19-associated deaths in these population groups through the different epidemic waves in Norway.

Specific objectives

The first aim was to describe the variation in incidence rates of SARS-CoV-2 infections and deaths in long-term care facility (LTCF) residents and non-nursing home residents ≥ 65 years. The second aim was to estimate and compare the risk of SARS Cov-2 infections and deaths in the two study groups and different factors associated with variation in risk.

Materials and methods

This cohort study used individual data from the Norwegian national emergency preparedness register, from week 9, 2020 to week 52, 2021. We computed incidence rates in total and for each wave for LTCF residents and non-nursing home residents ≥ 65 years. Survival analysis was used to estimate crude and adjusted hazard ratios for SARS-CoV-2 infections and deaths in the two study groups. The study period was stratified in five waves.

Results

The incidence rate and risk of SARS-CoV-2 infections and deaths in the two study groups varied through the epidemic in Norway, with LTCF residents having a higher incidence rate and risk of SARS CoV-2 infection and death in total compared with non-nursing home residents. The difference in risk remained statistically significant when adjusting for vaccine coverage, test activity, age, and gender.

Conclusions and Implications

This study showed that LTCF residents have a statistically significant higher risk for SARS CoV-2 infections and COVID-19-associated deaths in total compared to non-nursing home residents. These results are consistent with previous studies in other countries. Further research is needed, to explore factors on the individual, facility, and community level that can explain this difference.

Microbiological growth in flexible endoscopes - a retrospective follow-up of three years of culture results

Heléna Jakobsson, 2022

Degree Project in 1 year Master programme in medical microbiology, with specialization in infection prevention and control, 15 hp

Institute of Biomedicine, Sahlgrenska Academy, University of Gothenburg 2022

Abstract

Introduction

Flexible endoscopes with multiple channels are complex instruments with a range of applications that lead to a high degree of contamination. Rigorous control regarding the processes of cleaning, disinfection, storage and maintenance is required to prevent the transmission of microorganisms between patients. Although the risk of transmission is considered low, contaminated endoscopes are the most commonly reported reusable medical devices causing healthcare-associated infections.

Aim

The purpose of the study was to retrospectively investigate whether or not the proportion of endoscopes that met the microbiological requirements had changed over time after the introduction of a standardized routine for cleaning and disinfection, and whether or not it differed between different types of endoscopes.

Method

A retrospective study was conducted, based on microbiological cultures from endoscopes with multiple channels, from hospital-related units with endoscopic services in Region Skåne during the years 2019-2021.

Result

The analysis included 2 895 test results. The proportion of endoscopes that met the microbiological requirements did not change significantly over time ($p = 0.216$), regardless of endoscope type. Cystoscopes and duodenoscopes were the endoscopes that more rarely met the criterion of acceptance. The most frequently detected microorganisms originated from skin and environment, while pathogenic microorganisms were present to a significantly lower degree.

Conclusion

No significant alteration in the proportion of the endoscopes that met the criterion of acceptance occurred over time. Further analysis is needed concerning which factors have affected the result, as well as which threshold values of colony forming units that reflect a deficient disinfection process and not just contamination that has occurred at the time of sampling. Continued microbiological surveillance of endoscopes is necessary to ensure patient safety.

Abstract

Degree project: 1-year Master program in medical microbiology, with specialization in infection prevention and control, 15 hp

Title: Costs and effectiveness associated with contact tracings due to unexpected findings of methicillin-resistant *Staphylococcus aureus* in Oslo University Hospital

Author: Berit Sofie Karlsen

Institution of Biomedicine, Sahlgrenska Academy, University of Gothenburg, Sweden, 2022

Background: Methicillin-resistant *Staphylococcus aureus* (MRSA) is a challenge in most healthcare-settings. Due to strict MRSA-policy, the prevalence of MRSA has been low in Scandinavian countries and the Netherlands. In Norway, the national guidelines are comprehensive with extensive contact tracings in all hospitals when coincidental findings occur.

Aim: The aim of this study was to evaluate the contact tracings performed in Oslo University Hospital, which contains four large hospitals in central-Oslo, and to estimate the costs and effectiveness of this procedure.

Materials and methods: Data was collected from contact tracings performed in the hospital between 2016 and 2019. Costs for MRSA-screening of exposed cases were requested from the Microbiological Department. Estimates for time consumed were taken from the nurses who were responsible of conducting the contact tracings, represented by staff-nurses and infection control nurses.

Results: Almost 450 contact tracings were performed during the study period, with more than 6000 exposed cases subjected. Of these, the majority were healthcare workers (HCW). Only a few secondary cases were detected. Most of them were patients, and occurred due to an outbreak in a Newborn Intensive Care Unit. No HCW were found MRSA-positive in this outbreak.

Estimated costs for contact tracings during the study period were almost 2.6 million NOK. Costs per secondary finding were high, and costs for detecting one secondary case were extremely high.

Conclusions: The current procedure for contact tracing is time consuming and resource-intensive. Although a large number of exposed individuals were screened, MRSA-transmission was a rare phenomenon in our hospitals during this period.

Implications: Based on the findings in our study it could be debated if the extensive contact tracings are cost-effective, and we suggest the current guidelines to be revised. We assume it will be more cost-effective to emphasize hand hygiene compliance and other standard precautions.

Examensarbete för 1-årig Magisterutbildning i medicinsk mikrobiologi, med inriktning mot smittskydd och vårdhygien, 15 hp

Characterization and typing of Clostridioides difficile using proteomics and mass spectrometry

Lucas Lundbäck, 2022, institutionen för biomedicin, Sahlgrenska akademien, Göteborgs universitet

Abstract

Introduction

Clostridioides difficile is a bacterial species often associated with antibiotic treatment. Many strains produce toxins, which can cause disease. Toxins are also relevant in diagnostics as well as epidemiology. Some *C. difficile* variants are considered more virulent, and there are multiple approaches to perform typing of *C. difficile*.

Aim

In this project, our aim was to investigate whether proteomics and mass spectrometry (proteotyping) can be used for typing of *C. difficile* and hence be used to distinguish between separate outbreaks, caused by different strains. Furthermore, we wanted to investigate whether proteotyping can be used to detect expression of *C. difficile* toxins.

Material and methods

The experimental design included six *C. difficile* strains, three from PCR ribotype 001 and three strains from PCR ribotype 014. The proteins expressed by the strains were digested into peptides using trypsin. Samples were then analyzed using liquid chromatography tandem mass spectrometry, resulting in the identification of peptides and proteins.

Results

Around 25000 peptides and 2400 proteins were identified in the *C. difficile* strains. Analysis using the MiCId bioinformatics pipeline, with a generated dendrogram, showed the typing capability and possibility to show similarities and dissimilarities of strains in outbreak clusters. Furthermore, the toxins A and B, as well as proteins related to antimicrobial resistance, were detected.

Conclusion and implications

In conclusion, the results indicate that there is a lot of potential in further studying *C. difficile* using proteomics and mass spectrometry. The proteotyping approach not only allows for identification at the species and strain level, but also detection of expressed phenotypic antimicrobial resistance and traits of virulence, including the expression of toxins. Proteotyping thus provides the potential for highly sensitive and rapid diagnoses of infectious bacteria, without the time-consuming cultivation steps, which could have a significant impact on the overall treatment of infectious diseases.

Does probiotic therapy have an effect on *Clostridioides difficile*-associated diarrhea in hospitals?

A systematic literature study

Examensarbete för 1-årig Magisterutbildning i medicinsk mikrobiologi, med inriktning mot smittskydd och vårdhygien, 15 hp

Anne Berit Lysberg Brønlund, 2022

Institutionen för Biomedicin
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Abstract

- **Introduction:** *Clostridioides difficile*-associated diarrhea (CDAD) is a disease characterized by mild antibiotic-associated diarrhea, to severe and life-threatening pseudomembranous colitis due to the toxin-producing *Clostridioides difficile*. *Clostridioides difficile* infection (CDI) is considered in adults to be a common cause of hospital-acquired infections. Previous randomized controlled trials, recorded before March 21, 2017, suggest that probiotics are effective in preventing CDAD in hospitalized patients, especially those at high risk for CDAD. However, recent clinical guidelines do not recommend probiotic prophylaxis.
- **Aim:** The purpose of the thesis is to investigate whether there are new and well-documented studies that support or strengthen the use of probiotics to prevent and /or reduce CDAD in hospitalized or recently discharged adult patients receiving antibiotic treatment.
- **Methods:** Clinical studies from 2017-2022 that examined probiotics for the prevention of CDAD, or antibiotic-associated diarrhea (AAD) in addition, or *C. difficile* infection, are included in the literature study. Only studies with english-language text and adult patients are included. Pubmed and Google Scholar database are searched. The studies are quality assessed using the GRADE system (Grading of Recommendations, Assessment, Development and Evaluation).
- **Results:** Five clinical trials (17205 participants), two of them randomized and blinded met the inclusion criteria for our review. The quality of the documentation in these studies was assessed as high for one, low for three and very low for three of a total of seven relevant outcomes. The study with the highest documentation quality showed no significant effect of probiotics against AAD, while the rest showed that probiotics could reduce the incidence of CDI especially in elderly patients during antibiotic treatment.
- **Conclusion/Implications:** There is still low evidence that probiotics can prevent or reduce CDAD in hospitalized or recently discharged adult patients receiving antibiotic treatment.

Degree Project in 1-year Master programme in medical microbiology, with specialization in infection prevention and control, 15 hp		
Title: Nurses experiences of their role in rational antibiotic use in suspected urinary tract infection in elderly at Danish nursing homes. A qualitative study among nurses in nursing homes.		
Author: Tina Marloth Institution of biomedicin, SAHLGRENSKA AKADEMI, Göteborgs universitet, Sverige 2021		
Author's position and address: Infection Control Nurse, Herlev and Gentofte Hospital, Department of Clinical Microbiology Borgmester Ib Juuls Vej 52, 2730 Herlev, Denmark		
Supervisor: Sif Helene Arnold, doctor, Ph.d., Center of General Practice, University of Copenhagen, Denmark		
No. of pages: 28	Language – thesis: Danish	Language – abstract: Danish/English
<p>Background: Asymptomatic bacteriuria (ASB) is a frequent cause of inappropriate use of antibiotics in Danish nursing homes. Rational antibiotic use in this field presupposes that nursing staff have sufficient knowledge to diagnose urinary tract infection (UTI). Observation and diagnosis of UTI take place in close collaboration between the nurse and other nursing staff.</p> <p>Aim: To investigate how nurses in nursing homes experience their role in rational use of antibiotics in elderly and their experience of how they can influence the decision on antibiotic treatment.</p> <p>Method: A qualitative study based on semistructured interviews with seven nurses from five nursing homes was performed. The thematic analysis of the transcribed interviews was conducted with inspiration from Braun and Clarke's guidelines.</p> <p>Results: Elderly people with dementia, behaviour change and a positive urinary dipstick often make nursing staff react in a certain way. Nursing staff have similar expectations about elderly suffering from UTI. Perceived barriers that may explain why nurses may find it difficult to contribute to rational antibiotic use in case of suspicion of UTI in residents of nursing homes were identified.</p> <p>Conclusion: Similar experiences among nurses in their role in rational use of antibiotics in suspected UTI in elderly are found. Knowledge about this is useful to support the effort of rational antibiotic use in this field.</p>		
Key words: Change management, cognitive bias, infection control, nurse, nursing home, organization, urinary tract infection, UTI		

Examensarbete för 1-årig Magisterutbildning i medicinsk mikrobiologi, med inriktning mot smittskydd och vårdhygien, 15 hp

Vancomycin resistant enterococci in toilets and shower drains, and the effect of peracetic acid disinfection

Mona Ramskov Kjærsgaard, 2022, institutionen för biomedicin, Sahlgrenska akademien, Göteborgs universitet

Abstract

Introduction. Vancomycin-resistant enterococci (VRE) have been prevalent at the Department of Hematology, Aarhus University Hospital since 2009. Enterococci are stable in the hospital environment, but little is known about VRE in toilets and drains.

Aim. The aim was to investigate whether disinfection with peracetic acid influenced VRE in toilets and shower drains, regarding prevalence, genetic composition, and clonality.

Materials and methods. Toilets and drains of inpatient bathrooms were disinfected with peracetic acid at various frequencies. January 1st, 2020, through March 31st, 2022, samples from toilets and drains of the transplant unit and the general hematology unit were cultured on selective media. VRE were identified by MALDI-TOF and *vanA/B* PCR, and sequenced. Multi locus sequence typing (MLST), core genome MLST (cgMLST), and single nucleotide polymorphisms (SNP) were used to describe the genetic composition.

Results. At the general hematology unit, the VRE prevalence was significantly reduced during the intervention. The baseline prevalence at the general hematology unit was higher than at the transplant unit. The genetic composition was polyclonal and there was a shift in resistance genotypes during the study period.

Conclusion. VRE prevalence was reduced, but not eliminated. Genetic composition changed, but causality cannot be determined due to limited knowledge of contributing factors.

Implications. VRE in toilets and drains may contribute to indirect contact transmission between consecutive patients.

Examensarbete för 1-årig Magisterutbildning i medicinsk mikrobiologi, med inriktning mot smittskydd och vårdhygien, 15 hp

Is *Clostridioides difficile* Associated with Higher Mortality in Hematological Disease Patients?

Anne Salomonsen, 2022, institutionen för biomedicin, Sahlgrenska akademien, Göteborgs universitet

Abstract

Background: Department of Hematology has the highest incidence of nosocomial *Clostridioides difficile* (*C. difficile*)-infections in Oslo University Hospital. Department of Infection Prevention aimed to analyze the impact for this department's population, for optimizing infection prevention measures.

Aim: The objective was to investigate if *C. difficile*-infection patients were associated with a higher risk of death compared to those tested, but found to be *C. difficile*-negative, among adult hematological malignancy patients. We also wanted to know when the positive tests were confirmed and which ribotypes that were identified.

Materials and methods: We conducted a retrospective cohort-study based on laboratory data and electronic patient records for these patients tested for *C. difficile*.

Results: We found *C. difficile* in 20% of the patients, mostly among acute myelogenous leukemia (AML)-patients and allogeneic stem cell transplant recipients. The relative risk of dying within 12 months was 1.6 (95% CI 1.1-2.3). The median time to death was more than twice as long for patients without *C. difficile*-infection. The majority of the infections was classified health care associated. There were no cases of Ribotype 027 identified.

Conclusion: *C. difficile* in hematological malignancy patients was associated with a higher risk of death within 12 months from symptom onset. AML-patients / stem cell recipients were particularly vulnerable. Cross-contamination/outbreak in the hospital were probably not causing the health care associated infections, but confirmation by whole genome sequencing is pending.

Implications: These results are useful for the Department of Infection Prevention to allocate resources for preventive measures against *C. difficile* in Department of Hematology and an incentive for further studies for better infection control and prevention measures in this population.

Abstract

Degree Project: 1-year Master programme in medical microbiology, with specialization in infection prevention and control, 15 hp
Title: Success of treatment for MRSA throat carriage and risk factors for treatment failure in North Denmark Region
Author: Anne Kathrine Schultz Christensen Institution of biomedicine, SAHLGRENSKA AKADEMY, University of Gothenburg, Sweden 2022
<p>Background: The Danish Health Authority recommends that MRSA carriers undergo topical treatment with chlorhexidine body wash and mupirocin nasal ointment. Previous studies have shown that MRSA carrier-condition in the throat is associated with lower success of treatment compared to carrier-condition in other body sites.</p> <p>Aim: Studying the effect of topical treatment for MRSA carrier-condition in the throat and to identify risk factors for treatment failure among patients in the North Denmark Region (RN).</p> <p>Materials and methods: Population-based retrospective cohort study with treatment data on patients in RN 2018-2019. Success of treatment was defined as patients who were declared MRSA-free at the 6-month follow-up test. Data was structured in tables displaying treatment success and analysis of sensitivity as well as univariate analysis with indication of relative risk (RR) and risk difference (RD) with 95% confidence interval.</p> <p>Results: 179 patients underwent topical treatment, 42 patients (23%) dropped out because of missing follow-up test. 137 completed the follow-up tests. 61 patients were MRSA-free after 6-month follow-up and 76 were not MRSA-free.</p> <p>The success of treatment among patients who were MRSA-free and completed follow-up test, was 44,5% with interval between 34,1%-58,1% depending on the outcome of the patients who were lost to follow-up.</p> <p>Residence with 3 and 4 positive household members, children/adolescents between 2-20 years, MRSA of human originate, imported MRSA strain, presence of Panton-Valentine leucocidin genes and male gender, were all factors associated with significant higher risk of treatment failure.</p> <p>Conclusions: In an unselected cohort of patients with MRSA carrier-condition in the throat, one third will be able to achieve MRSA-freedom after one to two topical treatments. This moderate effect outweighs disadvantages of adding antibiotic treatment. The effect depends on other individual risk factors for not becoming MRSA-free.</p> <p>Implications: the study contributes with quantitative evaluation of the Danish strategy with a view to limiting the spread of MRSA and retain a low incidence of MRSA in the community.</p>

Examensarbete för 1-årig Magisterutbildning i medicinsk mikrobiologi, med inriktning mot smittskydd och vårdhygien, 15 hp

Infection control visits can improve hand hygiene in nursing homes

Elisabeth Smihaug, 2022, institutionen för biomedicin, Sahlgrenska akademien, Göteborgs universitet

Abstract

Background

Healthcare-associated infections (HAI) are a problem, and for patients in nursing homes it can have serious consequences due to impaired function and increased mortality. Antimicrobial resistance is a global threat. Hand hygiene is the single most important measure to prevent HAI. Nursing homes do not have dedicated infection control personnel, making systematic efforts in infection control difficult. Infection control visits is a tool that can be helpful in focusing on hand hygiene in nursing homes, and a tool for collaboration between nursing homes and infection control staff in hospitals that provides advice to the municipal health service.

Aim

Compliance with hand hygiene for healthcare professionals and patients in nursing homes might increase by participating in a project that has a systematic focus on infection control

Materials and methods

Self-reported compliance with hand hygiene, and observation of work attire was registered at 10 measurement times in the period December 2020 - May 2021, for employees at 10 nursing homes from 4 municipalities in northern Norway. A total of 717 employee observations are included in the data material.

Results

Self-reported performance of hand hygiene after using gloves increased significantly during the project period, from 78% to 98% (p-value 0.005). Regarding self-reported hand hygiene training and offering hand hygiene to patients before meals, there was no significant change over time. The same applies to observations of whether employees were correctly dressed and bare below the elbows, where there was a high degree of compliance throughout the period.

Conclusion and Implications

Infection control and antibiotic visits are a useful tool for focusing on hand hygiene, and a suitable collaboration forum between nursing homes and infection control personnel in hospitals. Nevertheless, there was sparse measurable improvement in self-reported hand hygiene.

The risk of spreading antimicrobial-resistant bacteria from a raw meat-based dog or cat diet, to humans – a systematic literature review

Degree Project in 1 year Master programme in medical microbiology, with specialization in infection prevention and control, 15 hp

Johanna Sveding Höög

Institute of Biomedicine, Sahlgrenska Academy, University of Gothenburg 2022

Abstract

Introduction

Many pet owners feed their pets a raw meat-based diet. The diet is based on raw meat and not heated before use. Many believe that it is a natural diet and are not aware of the risks associated with this diet such as antimicrobial-resistant bacteria that can be found in raw meat-based diets.

Aim

To investigate if there is a risk of spreading antimicrobial-resistant bacteria from raw meat-based dog or cat diet, to humans.

Methods

A systematic literature review with six included articles was performed to answer the research question. The search databases PubMed and Scopus were used. *Inclusion criteria:* original research articles written in English or Swedish between 2010-2022, research about antimicrobial-resistant bacteria in raw meat-based diets.

Results

The included studies investigated the amount and presence of antimicrobial-resistant bacteria in raw meat-based diets. All studies showed that antimicrobial-resistant bacteria can be detected in raw meat-based diets.

Conclusion

Both animals and humans can possibly get infected from antimicrobial-resistant bacteria from raw meat-based pet diets. The infection may occur by direct or indirect contact.

Implications

Careful hand hygiene is essential in contact with raw food, and handling of animal faeces

when the animal is on a raw meat-based diet. Pregnant, older, children, sick or immunosuppressed people should not handle the raw product and avoid all contact with animals fed a raw meat-based diet. Antimicrobial-resistance is a global threat and it is crucial to limit the spreading of antimicrobial resistant bacteria from raw food. The general public must be informed about the risks since both animals and humans may get infected from handling raw meat-based diets.

Examensarbete för 1-årig Magisterutbildning i medicinsk mikrobiologi, med inriktning mot smittskydd och vårdhygien, 15 hp

CysB* gene mutations in clinical isolates of mecillinam resistant *Escherichia coli* and *Klebsiella pneumoniae

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ABSTRACT

Introduction

Mecillinam (MEC) is a beta-lactam antibiotic used for lower urinary tract infections. MEC resistance in clinical isolates of *E. coli* is conferred by *cysB* mutations, but it has not been known if this is also the case in *K. pneumoniae*.

Aim

The aim was to determine whether *cysB* mutations were found in MEC resistant isolates of *E. coli* and *K. pneumoniae* and to compare the rates of *cysB* mutations. Presence of beta-lactam resistance genes, phenotypical antibiotic resistance and sequence type designation were also studied.

Materials and methods

Clinical isolates of MEC resistant *E. coli* and *K. pneumoniae* underwent whole genome sequencing. The *cysB* sequences were compared to reference genomes and analyzed for beta-lactam resistance genes and sequence type designation. The odds ratio and 95% confidence interval were calculated for the difference in proportion of *cysB* mutations in *E. coli* and *K. pneumoniae*.

Results

CysB mutations were present in a portion of MEC resistant *E. coli* and *K. pneumoniae* isolates. The difference was significant. A number of *K. pneumoniae* and *E. coli* isolates carried ESBL genes. Concurrent antibiotic resistance was common in MEC resistant isolates and there was a high diversity of sequence types in both species.

Conclusion

CysB mutations may confer MEC resistance in *K. pneumoniae* and *E. coli*. Our findings suggest that there are additional mechanisms of resistance in both species.

Implications

Knowledge of mechanisms of antibiotic resistance could be used to design new drugs.

Abstract

Degree Project in 1-year Master programme in Medical Microbiology, with specialization in Infection Prevention and Control, 15 credits.		
Title Identification of Barriers and Enabling Conditions for the Prevention of Infections in connection with Care and Treatment in the Primary Health Care Sector. A Qualitative Interview Study.		
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No. of pages 36	Language Danish	Date of approval 17.06.2022
<p>Introduction: Care in the familiar home environment is psychologically beneficial and increasingly more care is performed in the patients homes by primary care nurses, as well as care staff without medical training. Infections are quite frequent among patients in home care and may require unplanned hospitalizations. In hospitals and nursing homes, preventive measures against infections are taught and compliance with hygiene rules is checked regularly, but little is known regarding how infections may be avoided when the patient is cared for at home.</p> <p>Aim: The purpose of this project is to uncover and describe how nurses in the primary health care sector view the risk of infections among patients receiving advanced care in their homes and to identify perceived enabling conditions, as well as barriers, for adherence to standard and transmission-based precautions against infections.</p> <p>Method: Minor literature study in combination with individual semi-structured qualitative interviews.</p> <p>Results: Most nurses believed that adherence to hygiene guidelines were essential for protection against infection but could be challenging in the home environment. They identified a difference between the hospital context where, “Everything is allowed” versus the need to adapt to the conditions set by the patients when you are, “A guest in their home”. Factors regarded as enabling infection control included easy access to hand sanitizers and personal protective equipment. Obstacles could be difficulties to find surfaces clean enough to perform procedures such as wound treatment, instillation of catheters, etc., and even lack of sufficient lighting. Hand hygiene could be compromised by lack of running water, soap, and clean towels, in the homes of some of the patients. Tools intended for single use, could be used repeatedly, which led to doubts regarding their proper sterilization. Further, keeping wound dressings etc. under aseptic conditions when stored in the homes of patients could be problematic. Care staff lacking medical training, were regarded as insufficient as well as awareness of infectious diseases and methods for their prevention resulting in the use of either too little or too much personal protective equipment. The nurses recognized that training of such staff in basic hygiene and infection control would benefit the patients, as infections might be avoided and identified at an earlier stage than today. Relatives were, in general terms, seen as allies who could be engaged in collaboration regarding infection control and surveillance of the patients health condition. Many of the interviewees expressed a wish to discuss the problems and challenges with adherence to infection control guidelines with their colleagues.</p> <p>Conclusion: Several obstacles that increase the risk of infection in home care patients were identified, but also protective factors and procedures. Teaching, as well as discussion among colleagues might help improve these conditions.</p> <p>Implications: As many patients today receive home care and as infections are common in this setting, focus should be put on how the nursing staff can implement hygienic guidelines during home care.</p>		
Key words Qualitative. Nurse. Primary healthcare sector. Risk of infection. Barriers and enabling conditions. Standard precautions.		

Examensarbete för 1-årig Magisterutbildning i medicinsk mikrobiologi, med inriktning mot smittskydd och vårdhygien, 15 hp

Dare to dive in? Antibiotic resistant bacteria in recreational water in Gothenburg, Sweden

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ABSTRACT

BACKGROUND

Antibiotic resistant bacteria are today one of the major threats to public health. Such bacteria, as well as antibiotic resistance genes, disseminate easier in certain environments and settings. To handle the problem of antibiotic resistance, knowledge on mechanisms for how pathogens acquire resistance, and when and where humans are at risk of exposure, colonization and infection by such pathogens is crucial.

AIM

This study cultivated bacteria with resistance to fluoroquinolones or with phenotypic resistance resembling ESBL/ESBL_{CARBA} in swimming pools used by the public and in recreational freshwater lakes in and around Gothenburg, Sweden.

MATERIALS AND METHODS

Water samples were cultivated and incubated on different media and at different temperatures. Cefotaxime, meropenem, temocillin, and ciprofloxacin were used to test gram negative bacteria for antibiotic resistance.

RESULTS

One lake did not contain cultivable bacteria. From all other lakes bacteria with resistance to at least one but often multiple antibiotics was found. Gram negative bacteria grew more abundant after incubation in 30 °C compared to 37 °C, the opposite being true for gram positive bacteria. No cultivable pool bacteria was found.

DISCUSSION

Chlorination of public pools is likely an effective way of killing bacteria. Using freshwater lakes for swimming may put the public at risk of acquiring antibiotic resistant bacteria.

IMPLICATIONS

There is a need for more research to understand risks for possible colonization and symptomatic infection from using lakes and pools for swimming and other recreational activities. Protocols for cultivation of water from lakes and pools should be evaluated.

Nurses' experiences of facilitators and difficulties in complying to the basic hygiene routines within the emergency medical services

Examensarbete för 1-årig Magisterutbildning i medicinsk mikrobiologi, med inriktning mot smittskydd och vårdhygien, 15 hp

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Abstract

Introduction: Compliance to basic hygiene routines is of importance to decrease the risk of health-care associated infections. In the emergency services the compliance comes with special requirements because the environments, in which the care is conducted, are complex and varied.

Aim: The aim of the study was to describe nurses' experiences of facilitators and difficulties in complying to the basic hygiene routines within the emergency medical services.

Method: Focus group interviews with ambulance nurses was conducted. The analysis was made with manifest content analysis.

Results: 6 focus group interviews were conducted, with a total of 24 participants. 4 categories and 14 sub-categories which elucidate the nurses' experiences of facilitators and difficulties in complying to the basic hygiene routines emerged in the analysis. They are presented in two domains: "facilitators" and "difficulties". The categories were "having to deal with obstructive internal and external circumstances", "working in an evolving care environment", "improvement of knowledge, skills and approach" and "to be prepared and have the ability to adapt".

Conclusion: The nurses in this study experienced facilitators and difficulties in complying to basic hygiene routines. Some difficulties could be resolved with small means, for example increasing the availability to hand-disinfectants, while others were more profound and structural, as lack of motivation to adhering to the hygiene routines. The experiences of facilitators that emerged highlight the ability of the ambulance nurses to be prepared for unexpected events and to adapt in an evolving care environment.

Implications: The results of this study can be used to further develop and improve hygiene routines in the prehospital setting.