Contamination of renal patients' hospital chart covers with vancomycin-resistant enterococci: Handle with care

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RESEARCH

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Abstract

Background

Vancomycin-resistant enterococci (VRE) have been increasingly associated with patients with renal failure attending large metropolitan teaching hospitals. Monash Medical Center has been following guidelines issued by the Department of Human Services to reduce the spread of VRE, but unfortunately this has had limited impact, especially in the renal unit. In an attempt to investigate the causes of the sustained VRE prevalence in the renal unit, this study sought to determine if renal patient chart covers were contaminated with VRE and if there was any genetic similarity to patient VRE isolates.

Method

Using convenience sampling, chart covers of patients colonised or infected with VRE were swabbed from July to September 2010 (n=46). Samples were also collected from chart covers of non-VRE patients. Molecular typing of all matching VRE patient and chart isolates was performed using pulsed field gel electrophoresis (PFGE) by the public health laboratory (Microbiological Diagnostic Unit, University of Melbourne).

Results

None of the patients who were VRE negative (n=14) had contaminated chart covers. VRE was recovered from two drug chart covers (patient A and B) from the 31 VRE positive patients sampled. One patient (patient C) was misidentified as a VRE patient for two weeks and was subject to contact precautions while being dialysed, yet three chart types belonging to this patient were found to be contaminated with VRE.

Conclusion

The findings of this study demonstrate that it is possible for patients' hospital chart covers to be contaminated with VRE even though there was no genetic similarity to the current patient strain. In this regard, the study reveals that patient charts may have an important role in spreading VRE.

Key Words

Vancomycin-resistant enterococci; renal patients; patient chart covers

What this study adds:

1. There is a possibility of spreading VRE via contaminated patient chart covers.
2. There are loop holes on current infection control guidelines with regards to controlling the spread of VRE.
3. VRE contamination of patient chart covers may be a marker of environmental contamination and lapses in healthcare workers' (HCWs') hand hygiene.

Background

Infection and colonisation with VRE has spread rapidly across hospitals in the United States, Europe and Australia.[1] VRE are now being seen with increasing frequency among patients with chronic renal failure, organ transplants recipients and cancer patients.[2] Due to the prominent role that patients with renal disease have played in the epidemic of vancomycin resistance, additional preventive measures that can reduce the prevalence of VRE in this patient group need to be addressed.[3]

At the referral hospital in question, the renal ward screened 586 patients for VRE in 2009 and, subsequently, 89 patients (15.2%) were found to be VRE positive. The prevalence of VRE in the renal ward continued to increase despite the adoption of the recommended infection control guidelines which enforce the use of additional contact precautions.[4] Several studies have implicated contaminated environmental surfaces in VRE outbreaks.[5-6] Among all possible environmental sources, this study focused on patient medical chart covers. VRE can survive up to 16 weeks on polyvinyl chloride (PVC) which is the material used on the outer cover of patient charts on this ward.[7]

The purpose of this study was to determine if renal patient chart covers were contaminated with VRE and if there was any genetic similarity to patient VRE isolates.[8] This molecular characterisation could provide information on possible routes of transmission.

Method

This study was approved by the Southern Health Research Ethics Committee. The study was undertaken in the renal unit of a large teaching hospital comprising an 18-bed ward and an acute dialysis unit with 10 chairs (two designated for VRE patients in a separate dialysis room). The hospital's infection control policy for patients colonised or infected with VRE includes allocation of single rooms, gloves and gowns (for all staff entering the patients' rooms) and two-step cleaning of the rooms daily and when the patients are discharged.

A cross-sectional design was used for this study. Using convenience sampling, the chart covers of all renal patients colonised or infected with VRE on sampling days were swabbed from July to September 2010. Samples were also collected from chart covers of non-VRE patients who were in the renal unit on the same day that sampling was being performed.

Three types of chart covers were utilised for patient care on this ward:

1. Case chart covers – kept outside rooms for VRE patients.
2. Drug and observation chart covers – kept outside patient rooms and when not required usually filed at the central nurses station.
3. Haemodialysis chart covers – accompany patients to the dialysis unit for the duration of the session and kept in a designated "clean" area in the case of known VRE patients.

None of the chart covers were cleaned regularly but on occasion the PVC cover may have been wiped over when visibly soiled with detergent. Most of the chart covers were re-used to house the notes of the subsequently admitted patients and were often in circulation throughout the hospital environment for a long period of time before they were discarded due to obvious marking or damage.

Laboratory Testing

A sterile cotton swab was moistened with normal saline and run along the entire external front and back surface of the PVC chart cover. This was then placed into trypticase soy enrichments broth (TSBS) and incubated for 48 hours at 35°C. To avoid cross-contamination, a two-step clean (detergent and hypochlorite) was performed on all chart covers sampled prior to returning them to their allocated places.

Broths were subcultured onto ChromID™ VRE agar plates (bioMérieux, France) for 48 hours. Suspected colonies were plated onto horse-blood agar (HBA) and a catalase and pyrrolidonyl arylamidase (PYR) test was performed as per usual microbiology testing. Identification and sensitivities were performed by Vitek 2 (bioMeriéux, France) and sent to the public health laboratory for further confirmation of identification (*ddl*) and resistance *van* gene typing.

Molecular typing of all matching VRE patient and chart isolates was performed using pulsed field gel electrophoresis (PFGE) by the public health laboratory (Microbiological Diagnostic Unit, University of Melbourne).[9]

Results

The results of 99 chart cover samples that were collected from 46 patients attending the renal unit during the study period are shown in Table 1. None of the patients who were VRE negative (n=14) had contaminated charts. VRE was recovered from two drug chart covers (patient A and B) from the 31 VRE positive patients sampled. One patient (patient C) was misidentified as a VRE positive patient for two weeks and was in contact precautions while being dialysed and all three chart cover types were found to be

contaminated with VRE. All VRE isolates were confirmed as *Enterococcus faecium* van B.

Patient status (n)	Case chart (VRE +ve)	Drug chart (VRE +ve)	Dialysis chart (VRE +ve)
VRE positive (31)	0	2	0
VRE negative (14)	0	0	0
VRE * (1)	1	1	1
Total charts sampled	38	38	23

Table 1: Contamination of renal patient chart covers with VRE (n=46)

VRE Vancomycin Resistant *E. faecium* van b

***Patient misidentified as VRE positive and dialysed with known positives**

Isolate genotyping

Genotyping was performed on VRE isolates from the three patients' "drug folders". Stored VRE rectal isolates (-80°C) from these three patients were also genotyped along with six new patient isolates identified from the renal unit during the study period. PFGE typing suggested that there was no correlation between patient and chart cover VRE isolates (data not shown). Patient A was determined to be VRE positive from a rectal swab as far back as January 2003 but the chart cover isolate was found to be a unique unrelated PFGE pattern. Similarly patient B was VRE positive from a rectal swab in May 2010, also with a unique unrelated PFGE pattern. Patient C was misclassified as VRE positive and dialysed with the VRE cohort group for two weeks before alerted as negative. This chart cover's PFGE pattern was closely related to two other VRE positive patients who were dialysed together with patient C on day three and nine respectively. [9]

Discussion

Our study demonstrated that medical chart covers can be contaminated with VRE. This confirms the results of other investigators who found that medical charts were contaminated with bacteria especially in areas that are commonly touched when a chart is handled.[10] These results are concerning especially as VRE patients were under appropriate precautions and the hand hygiene rate for the renal unit over the previous year was a credible 82%. It is interesting to note that VRE was discovered on all three chart covers of a non-VRE (patient C) suggesting that cross-contamination could have taken place with the VRE patients they were dialysed with.

Results of PFGE typing in our study suggest that there was no correlation between patient and chart cover VRE isolates. This suggests that VRE contamination of a patient chart cover may be more of a marker of environmental contamination and lapses in HCW hand hygiene. There are no studies that clearly prove VRE infections can be transmitted from chart covers to renal patients however it remains highly possible as enterococci survive well in dry environments and on inanimate surfaces.[10, 13]

Some studies have demonstrated that periodically wiping the chart covers with an antiseptic solution may decrease the risk of cross-contamination.[11] Our study supports the notion that regular cleaning of medical chart covers, with appropriate detergents as per hospital policy, or use of new chart covers for all patients on admission to the ward, may prove to be cost effective as suggested by other studies. [12]

Our study has several limitations. On commencement of the study, the researchers noticed an increased frequency of medical chart cover cleaning by health staff perhaps as a Hawthorne effect. Also, VRE positive patients at our hospital are considered positive for any subsequent admissions and not retested. It is possible that they may be colonised with new strains of VRE. These strains are most likely to come from the immediate environment (e.g. door handles, monitors, bedrails and blood pressure cuffs) and there is sufficient evidence in the literature to show that inanimate surfaces play a role in the transmission of VRE. [13]

Our numbers are small and despite the fact that few chart covers were contaminated the potential for this to occur multiple times on any ward needs to be considered when confronted with increasing rates of multi-resistant organisms.

Conclusion

In conclusion, our study demonstrates that it is possible for patient medical chart covers to be contaminated with VRE. Strict hand hygiene and decontamination of the environment may reduce VRE prevalence on medical chart covers. Above all, medical chart covers need to be cleaned regularly or replaced for each patient and should always be in a perfect condition.

References

1. De Lisle S, Pearl MT. VRE, a road map on how to prevent the emergence and transmission of antimicrobial resistance. CHEST 2003; 123: 504S-518S.

2. Karimi A, Navidinia M, Tabatabaii SR, Fallah F, Malekan M, Jahromy MH, Ahsani RR, Shiva R. The prevalence of Vancomycin resistant genes in enterococci isolated from the stool of hospitalized patients in Mofid Children's Hospital. GTMB 2009; 13: 294-300.

3. Torkas JI, Gehr T, Jarvis RW, Anderson J, Armistead N, Miller ER, Parrish J, Qaiyumi S, Arduino M, Holt SC, Tenover FC, Westbrook W, Light P. Vancomycin-Resistant Enterococci in patients at seven hemodialysis centers. Kidney Int 2001; 60: 1511-1516.

4. Department of Human Services, Victorian Government. Guidelines for the management of patients with Vancomycin-Resistant Enterococci (VRE) colonisation/infection. A Public Health and Development Division Publication, 1999.

5. Eckstein BC, Adams DA, Eckstein EC, Rao A, Sethi AK, Yadavalli GK, Donskey CJ. Reduction of Clostridium Difficile and vancomycin-resistant Enterococcus contamination of environmental surfaces after an intervention to improve cleaning methods. BMC Infectious Diseases 2007; 7: 61.

6. Goodman ER, Platt R, Bass R, Onderdonk AB, Yokoe SB, Huang SS. Impact of environmental cleaning intervention on the presence of Methicillin-Resistant Staphylococcus aureus and Vancomycin-Resistant Enterococci on surfaces in intensive care unit rooms. Infect Control Hosp Epidemiol 2008; 29: 593-599.

7. Noskin GA, Stosor V, Cooper I, Peterson LR. Recovery of Vancomycin Resistant Enterococci on fingertips and environmental surfaces. Infect Control Hosp Epidemiol 1995; 16: 577-81.

8. Kuriyama T, Williams DW, Patel M, Lewis MA, Jenkins LE, Hill DW, Hosein IK. Molecular characterization of clinical and environmental isolates of Vancomycin-Resistant Enterococcus faecium and Enterococcus faecalis from a teaching hospital in Wales. J Med Microbiol 2003; 52: 821-827.

9. Tenover FC, Arbeit RD, Goering RV, Mickelsen PA, Murray BE, Persing DH, Swaminathan B. Interpreting chromosomal DNA restriction patterns produced by pulsed-field gel electrophoresis: criteria for bacterial strain typing. J Clin Microbiol 1995; 33: 2233-2239.

10. Wendt B, Wiesenthal B, Dietz E, Ruden H. Survival of Vancomycin-Resistant and Vancomycin-Susceptible Enterococci on Dry Surfaces. J Clin Microbiol 1998; 36: 3734-3736.

11. Marinella MA, Elder BL. Bacterial Contamination of patient hospital charts. Infect Dis Clin Pract 2000; 9: 39-40.

12. Mayhall, GC. Control of Vancomycin-Resistant Enterococci: It is important, it is possible, and it is cost effective. Infect Control Hosp Epidemiol 2002; 23(8): 420-423.

13. Weber DJ, Rutala WA. Role of environmental contamination in the transmission of vancomycin-resistant enterococci. Infect Control Hosp Epidemiol 1997; 18(5): 306--309.

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PEER REVIEW

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CONFLICTS OF INTEREST

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ETHICS COMMITTEE APPROVAL

Southern Health Research Ethics Committee