"A Comparative Study of Two Disinfectants for Cleaning Various Intensive Care Unit Surfaces at A Tertiary Care Centre, Kanpur"

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Abstract:

Introduction: Nosocomial infections, also known as healthcare acquired infection, have become considerable threats to hospitalized patients, which results in increasing length of stay, medical costs and complication rates. Aim: This Study was undertaken to compare the effects of two disinfectants (1% glutaraldehyde and 70% isopropyl alcohol) for cleaning various ICU's at a tertiary care centre, Kanpur.

Material and Methods: Samples were collected from bed, monitor surface and table of the NICU's, PICU, MICU of Rama Hospital, Kanpur. Samples were collected before and after disinfection using appropriate disinfectants. After cleaning samples were collected after contact time of 20 minutes. For aerobic culture, samples were inoculated in liquid media like peptone water. After incubating for 24 hours at 37oC, the sample from the peptone water was inoculated on to one sets of blood agar plate, and incubated aerobically at 37oC for 48 hours. For anaerobic culture, samples was first inoculated in Robertson's cooked meat medium and incubated anaerobically at 37oC for 7 days.

Results: The growth of aerobic BA plates showed bacterial colonies before fumigation in NICU (23colonies), MICU (4c) and PICU (3c) but after the use of isopropyl alcohol only in NICU (6c) were found. . The growth of aerobic BA plates showed bacterial growth before disinfection NICU (23c), MICU (4c) and PICU (3c) but after the use of glutaraldehyde only in NICU (2) were found. Clostridium spp. was seen before disinfection in NICU in 3 RCM tubes but after the use of isopropyl alcohol it was seen in one tube but after the use of glutaraldehyde, no Clostridium spp. was found. Thus, our study showed 30 colonies before disinfection which was reduced to 6 colonies after the use of isopropyl alcohol and reduced to 2 colonies after the use of glutaraldehyde after aerobic incubation.

Conclusion: Thus, our study showed 30 colonies before disinfection reduced to 6 colonies after the use of isopropyl alcohol and reduced to 2 colonies after the use of glutaraldehyde after aerobic incubation, and it was found that glutaraldehyde is better disinfectant than isopropyl alcohol for both aerobic and anaerobic organisms.

Key Words: Glutaraldehyde, Isopropyl Alcohol, ICU.

Introduction

Nosocomial infections represent a major health problem because of the excess morbidity and mortality. 2 million people per year are affected by hospital acquired infections (5-10% of hospitalized patients). In the United States it is 8th leading cause of death directly or indirectly causing 80,000 deaths.[1] Treating nosocomial infections is challenging as most of the causative agents are multi drug resistant.[2] Major reservoir of multi drug resistant organisms (MDRO) is environmental surface and they remain viable for days to months on various inanimate surfaces.

The increasing emergence and spread of multi resistant bacteria in hospitals still continues to challenge infection control practices worldwide. [3]

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In spite of all efforts to improve hospital hygiene, nosocomial infections still pose a substantial risk to patients and added burden to hospitals.[4] Studies suggest that routine use of disinfectants to disinfect hospital floors and other surfaces is not justified due to lack of evidence of their being involved directly in disease transmission.[5]Though this environmental aspect of infection control is still controversial, during outbreaks observational evidence suggest definite role of surface transmission based on type of organisms contaminating the surfaces. In this regard there is sufficient data to show that inanimate environment serves as a secondary source for Cl. difficile, Methicillin resistant Staphylococcus aureus (MRSA) and Vancomycin resistant enter ococci (VRE).[6]

The efficacy was tested against locally isolated highly drug-resistant isolates of Klebsiella pneumoniae, Enterobacter aerogenes, Acinetobacter calcobaumannii, Pseudomonas aeruginosa, Methicillin-resistant Staphylococcus aureus (MRSA), Candida albicans and standard strain of Salmonella typhi. This study is undertaken to compare the effect of two disinfectants (1% glutaraldehyde and 70% isopropyl alcohol) for cleaning various ICU's at a tertiary care centre, Kanpur.

Material and Methods

Samples were collected from bed, monitor surface and table of the NICU's, PICU, MICU of Rama Hospital, Kanpur. Samples were collected before and after disinfection using appropriate disinfectants. After cleaning samples were collected after contact time of 20 minutes. For aerobic culture, samples were first inoculated in liquid media, peptone water. After incubating for 24 hours at 37oC, the sample from the peptone water was inoculated on to one sets of blood agar plate, and incubated aerobically at 37oC for 48 hours. For anaerobic culture, samples was first inoculated in Robertson's cooked meat medium and incubated anaerobically at 37oC for 7 days.

Results

The growth of aerobic BA plates showed bacterial colonies before - disinfection in NICU (23), MICU (4) and PICU (3) but after the use of isopropyl alcohol only in NICU (6) were found. The growth of aerobic BA plates showed bacterial growth during before - disinfection in NICU (23), MICU (4) and PICU (3) but after the use of glutaraldehyde only in NICU (2) were found. Clostridium spp. was seen in before - disinfection in NICU in 3 RCM tubes but after the use of isopropyl alcohol it was seen in one tube but after the use of glutaraldehyde, no Clostridium spp. was found. Thus, our study showed 30 colonies in Before - Disinfection which was reduced to 6 colonies after the use of isopropyl alcohol and reduced to 2 colonies after the use of glutaraldehyde after aerobic incubation.

Table No1: Before and after Disinfection with Isopropyl Alcohol

Before - Disinfection			After- Disinfection		
Area	**Aerobic Colonies**	**Anaerobic Culture**	**Area**	**Aerobic Colonies**	**Anaerobic Culture**
NICU	23	3tubes showed Cl.spp	NICU	6	1 tube showed Cl.spp
MICU	4	-	MICU	-	-
PICU	3	-	PICU	-	-

Table No 2: Before and after Disinfection with Glutaraldehyde

Before - Disinfection			After – Disinfection		
Area	**Aerobic Colonies**	**Anaerobic Culture**	**Area**	**Aerobic Colonies**	**Anaerobic Culture**
NICU	23	3tubes showed Cl.spp	NICU	3	-
MICU	4	-	MICU	-	-
PICU	3	-	PICU	-	-

Discussion

Disinfection plays a major role in preventing HAI's. Now a day's several disinfectants are available in market but still we need to search for better one which is more efficient and also cost effective.

S. No.	Study	Year	Results
1	R Mizbah et al.[7]	2019	This study showed glutaraldehyde was found 11% more efficient than isopropyl alcohol and when plates were incubated anaerobically glutaraldehyde was found 4% more efficient than isopropyl alcohol.
2	Tuhina Banerjee et al.[8]	2013	This study showed three disinfectants superoxidized water (SOW) and two quaternary ammonium compounds (QACs) and 70% ethyl alcohol were tested for their effectiveness against multidrug resistant (MDR) *Pseudomonas aeruginosa*, meticillin resistant *Staphylococcus aureus* (MRSA) and vancomycin resistant enterococci (VRE) SOW showed good activity against most of the isolates, except against MRSA in presence of organic matter, where QACs were better.
3	Malkit Singh et al. [9]	2012	This study showed a comparable average log reduction of test microbes on a smooth steel surface was noted (5.68,5.67,5.50) for Lysol, Bacillocid sp. and DesNet, respectively. Phenolics, although widely used may not be as good surface disinfectants as newer formulations like DesNet and Bacillocid special.
4	In the present study	2021	Our study showed 30 colonies before disinfection which was reduced to 6 colonies after the use of isopropyl alcohol and reduced to 2 colonies after the use of glutaraldehyde after aerobic incubation, and it was found that glutaraldehyde is better disinfectant than isopropyl alcohol for both aerobic and anaerobic organism.

Our studies correlate with study conducted by **R Mizbah et al. [7]**

Conclusion

Thus, our study showed 30 colonies in before disinfection which was reduced to 6 colonies after the use of isopropyl alcohol and reduced to 2 colonies after the use of glutaraldehyde after aerobic incubation, and it was found that glutaraldehyde is better disinfectant than isopropyl alcohol for both aerobic and anaerobic organism.

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