Determine disinfectant and antiseptic effectiveness using zone inhibition method

Science, Biology

Lab Report Title Page: Determine Disinfectant and Antiseptic Effectiveness Using Zone Inhibition Method Prepared for: By: Date: Introduction Page: Abstract This study is to examine the effects of different types of disinfectants by disk diffusion method using common agents such as Betadine, Clorox, Crest, Kiss My Face, Listerine, and Lysol. Wound care and general cleaning of home surfaces is a part of daily activity for many of the general population. Knowing which agents are effective against the bacteria that most commonly cause infection, disease, and illness allows educated decisions on which agents to use.

We compared the bactericidal effectiveness of 6 common agents widely used by the general public against 3 common bacterial organisms. Introduction Sterilization kills all organisms in or on an object or substance. Disinfectants and antiseptics do not sterilize since many types of organisms and spores are not killed. Disinfectants are described as antimicrobial agents that are used on inanimate objects such as an instrument or structural surfaces. The term antiseptic is usually applied to antimicrobial agents that are used on living tissue such as skin and throat mucosa.

A disinfectant must be capable of killing pathogens while it is in contact with them, so that they cannot grow again when it is removed. This action is said to be cidal (lethal), and it is described according to the type of organisms it kills as bactericidal, sporicidal, fungicidal, virucidal, etc... If the antimicrobial substance merely inhibits the organisms while it is in contact with them, they may be able to multiply again when it is removed. In this case, the agent is

said to have static activity and may be described as bacteriostatic, fungistatic, etc...

Microorganisms of different groups are not uniformly susceptible to chemical disinfection due to the structures of their cell walls. As an example, Mycobacterium are more resistant than most other bacteria because of their waxy cell walls. Of all microbial forms, bacterial endospores display the greatest resistance to both chemical and physical agents of disinfection. The efficacy claimed for a given disinfectant in killing vegetative bacterial species may have no bearing on its ability to destroy bacterial or fungal spores, mycobacteria, some viruses or prions.

A number of factors must be considered when choosing a disinfectant besides type of organism. These include exposure time, concentration of the antimicrobial agent, temperature, optimal pH activity of the antimicrobial agents, the concentration of the microorganisms present, and the toxicity of the agent for skin or its effect on materials to be disinfected. Here we will test the effectiveness of various antimicrobial substances by inoculatingcultureplates with the test organisms and then applying the disinfectant/antiseptic to the inoculated plate by a filter paper disk that has been dipped into the disinfectant/antiseptic.

This is a disk diffusion method that is similar to the method used to test the effectiveness of various chemotherapeutic agents. We will then measure the zone-of-inhibition. With this method, the presence of such a clear zone (lack of growth) surrounding the chemical shows either the cells have been killed

or that their growth has been inhibited. A zone of inhibition does not discriminate between bacterio-static and bactericidal chemicals. The 6 agents we will be testing are: Betadine (B) – A povidone-iodine preparation used mainly for skin disinfection and wound treatment.

Kills a wide range of disease-causing organisms including bacteria, fungi, many viruses, and most micro-organisms. Does not affect hydrophilic viruses such as polyomavirus and PBFD. Clorox (C) – A biguanide preparation of Sodium Hypochlorite used mainly for surface cleaning in various environments such as homes and hospitals to kill microorganisms. Bleach is effective as a disinfectant and kills many micro-organisms, but is not a viable solution to the spread of tuberculosis, bacterial spores and Chlamydia. Crest (Cr) – A widely used antimicrobial for oral bacteria and biofilms.

Especially useful on Gram-negative micro-organisms such as Aggregatibacter actinomycetemcomitans, Campylobacter rectus, Eikenella corrodens, and Fusobacterium nucleatum. Kiss My Face (Kf) – An organic alternative to typical alcohol based mouthwashes using aloe vera as antimicrobial agent and grapefruit extract as a polyphenol. Proven useful with Trichophyton mentagrophytes and Staphylococcus aureus. _ _. Listerine (Li) – An alcohol based antiseptic mouth rinse containing the active ingredient ethanol which is toxic to bacteria at concentrations of only 7%. Reduces dental carries, plaque and gingivitis.

Lysol (Ly) – A O-phenylphenol preparation of cresols used for surface cleaning in various environments such as homes and hospitals to kill

microorganisms such as fungi, Tuberculosis, certain viruses, _ staphylococcus_ and Pseudomonas bacteria. Does not kill nonenveloped viruses, such as _parvovirus, polyomavirus, papillomavirus, adenovirus and reovirus_, nor will they kill all bacteria types. The three common bacteria we will be testing against are: Pseudomonas aeruginosa - An ubiquitous environmental organism associated with whirlpools whereby infection is caused by immersion in contaminated water.

Staphylococcus aureus - A normal flora organism on the skin surfaces of most healthy humans. Escherichia coli – A large and diverse group of organisms associated with fecal remnants that have been ingested causing infection. Materials and Methods Page: Materials and Methods T-Soy plates (TSA) – Lawn spreading method Sterile swabs Forceps Sterile filter paper disks Disinfectants/Antiseptics We will follow the specific instructions to carry out this experiment as noted in Lab 16 p90 of Symbiosis by Pearson. Results Page: Results and Discussion

This experiment was conducted to show how different disinfectants and antiseptics kill bacteria. The results of our experiment under normal room conditions on the TSA agar were as follows: Conclusion Page: Conclusion Previous research has shown that if an antiseptic disinfectant agent does not kill bacteria, the risk of infection is significantly higher. We used a Gram-negative (P aeruginosa), a Gram-positive (S aureus), and a Gram-negative (_E. coli_) bacterium for bactericidal testing procedures. We allowed the TSA agar to mature over a 7 day period and then noted our results by viewing and measuring the zone inhibition (mm).

Findings were that while all had an effect, there were differences among how effective each agent was against each strain of bacterium used. Surface cleaning agents - Lysol was most effective against S. aureus and E. Coli, while Clorox did significantly well with all three bacterium. It appears from our findings that Clorox is the most effective disinfectant and antimicrobial of the six agents tested. Oral care agents - The effects of Listerine were less than stealer, while the organic product Kiss My Face was more effective with all three types of bacteria. Crest rated low as an effective agent for all three types of bacteria.

It is important to note that the standard deviation rose as high as 7. 8, which is a significant difference in the resulting data accuracy. Literature Cited Pearson, 2010. Symbiosis Lab 16 Disk Diffusion Assay to Determine Disinfectant and Antiseptic Effectiveness, pp. 89-91. Pearson Custom Publishing Vicki S. Rabenberg, Christopher D. Ingersoll, Michelle A. Sandrey, and Mary T. Johnson. The Bactericidal And Cytotoxic Effects Of Antimicrobial Wound Cleansers. 2002. Centers for Disease Control and Prevention http://www. cdc. gov/nczved/divisions/dfbmd/diseases/ecoli_o157h7/index. html#spread Violet I. Haraszthy, DDS, MS, PhD; Joseph J.

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