Public of Iraq
Ministry of higher education and scientific research
University Of Basrah
College of pharmacy

# Evaluation of the effect of certain disinfectant (Vanish) on bacteria isolated from a delivery wards in Basrah

A report
Submitted to the Council of the College of Pharmacy -University of Basra in Partial fulfillment of the requirements for the
Degree of B.V.M.S by :

**Asmaa Mohamad shnawa**

**Zainab Mohamad salman**

**Hussain Mohamad muhalhel**

Supervised by :

Dr.Ayad Q.Mahdi

# acknowledgment:

**TO :**

**DR.AYAD Q.MAHDI**

**ALAA. MOHAMAD**

**AFTER THANKING GOD FOR THE COMPLETION OF THIS WORK,**

We would like to experss our Deep Appreciation and sincer gratitude to all those who have kindly given their time and assistance during the preparation of this work

**ALL THESE LESSONS ARE EXPRESSIONS OF APPRECIATION TO YOU, OUR DEAR DOCTORS FOR YOUR ROLE IN THE SUCCESS OF THIS GRADUATION PROJECT. SO THANK YOU FOR ALL THE GREAT EFFORT YOU HAVE MADE**

# Abstract :

Microorganisms' spreading, and consequent infection propagation is a serious concern worldwide, yet there are still very few guidelines or legislation for infection propagation control in public spaces.

.Visitors and/or asymptomatic carriers also contribute to the spread of microorganisms, especially in situations where there is an apparent sense of safety, there are guidelines for surface cleaning and disinfection in hospitals, however, those recommendations are not sufficient to solve such a problem and the incorrect following of the disinfection instructions can even cause greater contamination problems.

**T. Cardoso, M. Almeida, J. Carratalà, I. Aragão, A. Costa-Pereira, A.E. Sarmento, L. Azevedo**

**Microbiology of healthcare-associated infections and the definition accuracy to predict infection by potentia drug resistant pathogens: a systematic review**

**BMC Infect. Dis., 15 (2015), p. 565, 10.1186/s12879-015-1304-2**

**View PDF View in ScopusGoogle Scholar**

# Introduction:

Bacterial contamination of the labor and delivery room is of clinical concern because it is one of the major risk factors of sepsis in neonates and most life threatening nosocomial infections for mothers after undergoing childbirth procedures.

Bauer, A. W., Kirby, W. M. M., Sherris, J. C., & Turck, M. (1966). Antibiotic susceptibility testing by a standardized single disk method. American Journal of Clinical Pathology, 45(4), 493–496.

Several studies have proved that surfaces in rooms of patients infected with important pathogens are frequently contaminated, and that a person admitted to a room previously occupied by an infected patient has an increased likelihood of developing colonization or infection with that pathogen
Additionally, delivery wards are often warm and humid environments, which can create an ideal breeding ground for bacteria

**J. Weber, W.A. Rutala, M.B. Miller, K. Huslage, E. Sickbert-Bennett**
**Role of hospital surfaces in the transmission of emerging health care-associated pathogens: Norovirus, Clostridium difficile, and Acinetobacter species**
**Am. J. Infect. Control, 38 (2010), pp. S25-S33, 10.1016/j.ajic.2010.04.196**

Furthermore, the presence of bodily fluids during delivery can increase the risk of bacterial transmission. For example, Group B Streptococcus (GBS) is a type of bacteria that is commonly found in the vagina and rectum of healthy women but can cause infections in newborns if they are exposed to it during delivery.

**J. Weber, W.A. Rutala, M.B. Miller, K. Huslage, E. Sickbert-Bennett**
**Role of hospital surfaces in the transmission of emerging health care-associated pathogens: Norovirus, Clostridium difficile, and Acinetobacterspecies**
**Am. J. Infect. Control, 38 (2010), pp. S25-S33, 10.1016/j.ajic.2010.04.196**

that require high levels of cleanliness and disinfection to prevent the spread of infections. One way to achieve this is through the use of disinfectants such as Vanish.
Vanish is a cleaning product that is designed to remove stains and kill bacteria. The active ingredient in Vanish is hydrogen peroxide, which is a powerful oxidizing agent.
Hydrogen peroxide works by producing destructive hydroxyl free radicals that can attack membrane lipids, DNA, and other essential cell components. Catalase, produced by aerobic organisms and facultative anaerobes that possess cytochrome systems, can protect cells from metabolically produced hydrogen peroxide by degrading hydrogen peroxide to water and oxygen. This defense is overwhelmed by the concentrations used for disinfection

**Garner JS, Favero MS. CDC Guideline for handwashing and hospital environmental control, 1985. Infect. Control 1986;7:231-43**

Delivery wards in hospitals can be a breeding ground for various types of bacteria, some of which are more common than others. Here are some of the most common bacteria that can be found in delivery wards:
1. Staphylococcus aureus: This is a type of bacteria that is commonly found on the skin and in the nose. It can cause infections if it enters the body through a cut or wound.
2. Escherichia coli: This is a type of bacteria that is commonly found in the intestines. It can cause infections if it enters the urinary tract or other parts of the body.
3. Group B Streptococcus: This is a type of bacteria that is commonly found in the vagina and rectum. It can cause infections in newborns if they are exposed to it during delivery.
4. Klebsiella pneumoniae: This is a type of bacteria that is commonly found in the intestines and can cause infections if it enters other parts of the body.
5. Pseudomonas aeruginosa: This is a type of bacteria that is commonly found in soil and water. It can cause infections if it enters wounds or other parts of the body.
It's important to note that hospitals take strict measures to prevent the spread of these and other bacteria, including regular cleaning and disinfection protocols, hand hygiene practices, and isolation precautions when necessary

# Materials:

## Tools:

1.Petridish
2.Loop
3.Sterilized cotton swabs
4.Test tube
5.Micropipete
6.Ruler

## Culture Media:

1.Nutrient Agar
2.Mueller-Hinton agar

## Disinfectant :

VANISH®:
1.Sodium carbonate
2.Sodium pericarbonate
3.Sodium sulfate
4.Sodium bicarbonate
5.Sodium silicate
6.C12-15 Pareth-9 (ASS)
7.TAED
8.Water
9.Protease enzyme
10.Disodium Distrylbiphenyl Disulfonate
11.Fragrance/parfum

# Apparatus:

1.Autoclave
2.Sensitive
3.Hot Plate
4.Refrigerator
5.Incubator
6.Vortex Mixer
7.Densicheck plus

# Method:

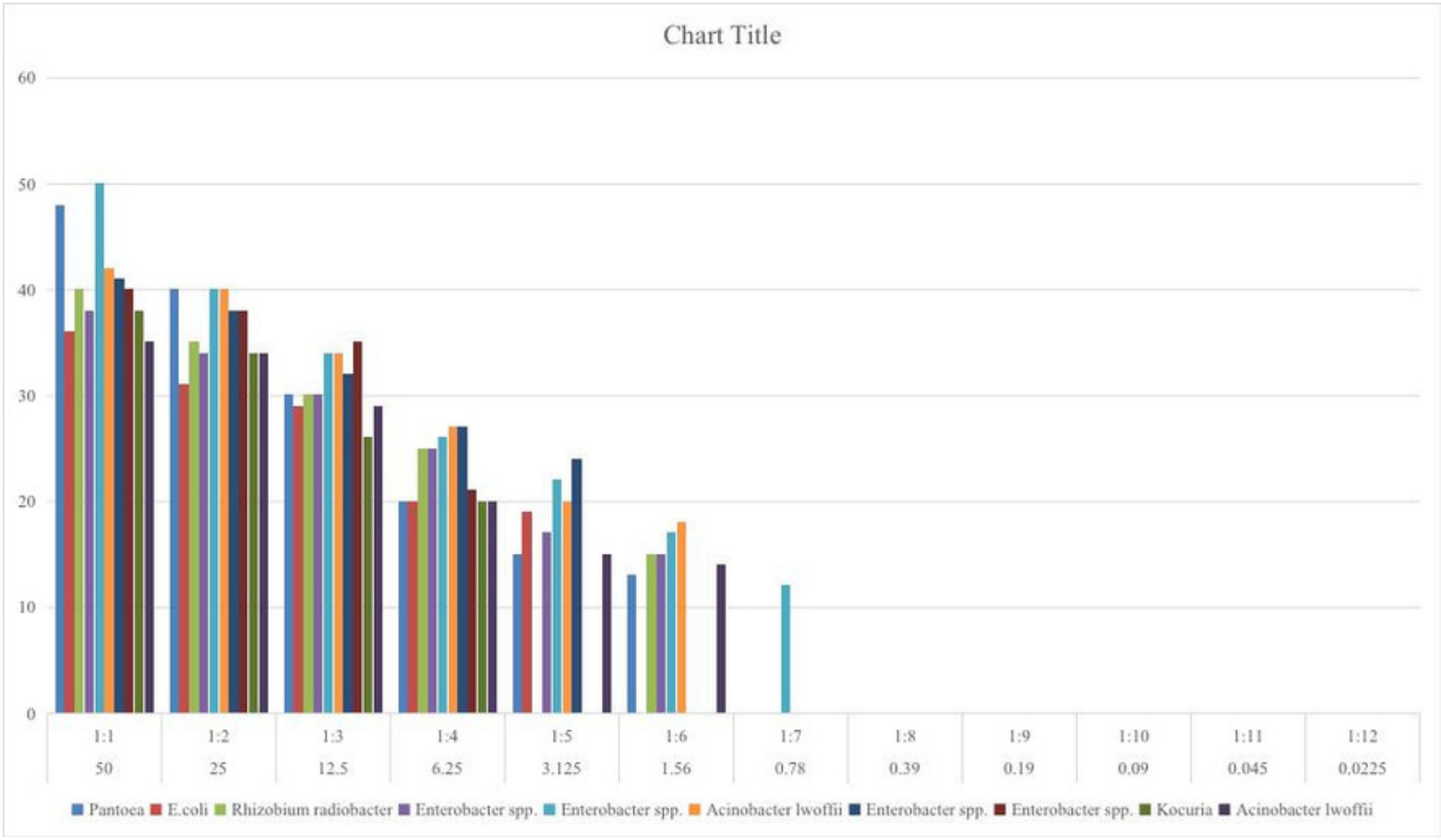
1.1. Preparation of culture media
We prepared two types of culture media: Nutrient agar for growth of different types of bacteria (gram +ve and gram –ve) and Muller-Hinton agar for the measurement of zone inhibition of disinfectant.
Media were prepared and sterilized with autoclave at 121C for 15 minutes.
1.2. Activation of bacteria
Using the loop, colonies of bacteria were taken and cultured on nutrient agar and incubated for 24 hours at 37C.
1.3. Preparation of bacterial suspension
After 24 hours, Using Densicheck plus to measure the number of bacteria in liquid suspension for each sample.
By taking colonies of bacteria by loop and adding 3mL of normal saline to the test tube and measure it. The acceptable readings are in the range of 0.5-0.63 McFarland for gram+ve and gram-ve bacteria.

# Method copm.

1.4.Preparation of serial dilutions of disinfectant
We prepared serial dilutions from 1:1 to 1:12 by adding 1mL of sterile distilled water to test tube and then adding 1mL of disinfectant (Vanish) for dilution 1:1 ;and then we took 1mL from the latter and add to 1mL of sterile distill water for dilution 1:2; And so on for the other dilutions.

1.5. Measure the effectiveness of disinfectant
The culture media (Muller-Hinton agar) was perforated; 100µL of the bacterial suspension were taken and spread on the plate; and then take 100µL of each dilution of disinfectant and put it inside the holes and let it dry; after that incubate for 24 hours at 37C .
On the next day; the inhibition zone was measured using a ruler for all the dilutions and the appropriate dilution (concentration) is known to inhibit all types of bacteria [lowest concentration to inhibit bacteria].

# Results:




The bacterial diversity decreases as the concentration of the disinfectant decreases

# DISCUSSION:

Based on our result. Vanish killed G+ Bacteria whilst it didnt has effect on G_ve BACTERIA
1:1 the most powerful conc that killed bacteria
The cut_off point between sensitivity and resistance was the conc. 1:4

In dilution 1:1-1:4 ،vanish killed bacterial
While in dilution 1:5 has been appeare resistanc to vanish
That means whenever dilution increase, the resistant to bacteria increase, too.

Note: When the conc decrased the diameter decrased too

Bactericidal activity against microorganisms depends on a number of factors, some of which are inherent qualities of the organism, others being the external physical and chemical environment. Awareness of these factors should lead to better use of disinfection and sterilization processes and will be reviewed briefly.
Number and Location of Microorganisms
All other conditions remaining constant, the larger the number of microbes, the more time a germicide needs to destroy all of them.. This reinforces the need for scrupulous cleaning of medical instruments before disinfection and sterilization.. Researchers also have shown that aggregated or clumped cells are more difficult to inactivate than monodispersed cells 414.

**414. Gillis RJ, Schmidt WC. Scanning electron microscopy of spores on inoculated product surfaces.MD 1983:46-9.**

Innate Resistance of Microorganisms
Microorganisms vary greatly in their resistance to chemical germicides and sterilization processes 342 Intrinsic resistance mechanisms in microorganisms to disinfectants vary

For example, spores are resistant to disinfectants because the spore coat and cortex act as a barrier, mycobacteria have a waxy cell wall that prevents disinfectant entry, and gram-negative bacteria possess an outer membrane that acts as a barrier to the uptake of disinfectants 341, 343-345. Implicit in all disinfection strategies is the consideration that the most resistant microbial subpopulation controls the sterilization or disinfection time. That is, to destroy the most resistant types of microorganisms (i.e., bacterial spores), the user needs to employ exposure times and a concentration of germicide needed to achieve complete destruction

**341. Russell AD, Russell NJ. Biocides: activity, action and resistance. In: Hunter PA, Darby GK, Russell NJ, eds. Fifty years of antimicrobials: past perspectives and future trends. England: Cambridge University Press,1995:327-65.**

**342.Russell AD. Bacterial resistance to disinfectants: Present knowledge and future problems.J.Hosp. Infect.1998;43:S57-S68.**

**343 Russell AD. Plasmids and bacterial resistance to biocides. J. Appl. Microbiol. 1997;83:155-65.**

**345. Russell AD. Principles of antimicrobial activity and resistance. In: Block SS, ed. Disinfection, sterilization, and preservation. Philadelphia: Lippincott Williams& Wilkins, 2001:31-55**

## Concentration and Potency of Disinfectants

With other variables constant, and with one exception (iodophors), the more concentrated the disinfectant, the greater its efficacy and the shorter the time necessary to achieve microbial kill. Generally not recognized, however, is that all disinfectants are not similarly affected by concentration adjustments. For example, quaternary ammonium compounds and phenol have a concentration exponent of 1 and 6, respectively; thus, halving the concentration of a quaternary ammonium compound requires doubling its disinfecting time, but halving the concentration of a phenol solution requires a 64-fold (i.e., 26) increase in its disinfecting time 365, 413, 420.

**365.Russell AD, McDonnell G. Concentration: a major factor in studying biocidal action. J. Hosp. Infect. 2000;44:1-3.**

**413. 1 Russell AD. Factors influencing the efficacy of germicides. In: Rutala WA, ed. Disinfection, sterilization and antisepsis: Principles, practices, challenges, and new research. Washington DC: Association for Professionalsin Infection Control and Epidemiology, 2004:162-70**

**420.Russell AD. Factors influencing the efficacy of antimicrobial agents. In: Russell AD, Hugo WB, Ayliffe GAJ, eds. Principles and practice of disinfection, preservation and sterilization.Oxford: Blackwell Science,1999:95-123.**

## Biofilms

Microorganisms may be protected from disinfectants by production of thick masses of cells 428 and extracellular materials, or biofilms 429-435.

**429. Anderson RL, Holland BW, Carr JK, Bond WW, Favero MS. Effect of disinfectants on pseudomonads colonized on the interior surface of PVC pipes. Am. J. PublicHealth 1990;80:17-21**

**435.Dunne WM. Bacterial adhesion: Seen any good biofilms lately? Clin. Microbiol. Rev. 2002;15:155-66.**

## Physical and Chemical Factors

Several physical and chemical factors also influence disinfectant procedures: temperature, pH, relative humidity, and water hardness. For example, the activity of most disinfectants increases as the temperature increases, but some exceptions exist. Furthermore, too great an increase in temperature causes the disinfectant to degrade and weakens its germicidal activity and thus might produce a potential health hazard.413

**413.Russell AD. Factors influencing the efficacy of germicides. In: Rutala WA, ed. Disinfection, sterilization and antisepsis: Principles, practices, challenges, and new research. Washington DC: Association for Professionals in Infection Control and Epidemiology, 2004:162-70.**

## Duration of Exposure

Items must be exposed to the germicide for the appropriate minimum contact time. Multiple investigators have demonstrated the effectiveness of low-level disinfectants against vegetative bacteria.64

**64.Rice EW, Clark RM, Johnson CH.**
**Chlorine inactivation of Escherichia coli**
**O157:H7. Emerg. Infect. Dis. 1999;5:461-3.**

# Recomended:

Vanish products are generally considered to have low toxicity when used as directed. The active ingredients in Vanish products are typically hydrogen peroxide, sodium carbonate, and surfactants, which are commonly found in many household cleaning products and are generally safe when used as directed. But vanish less effective than quaternary ammonium act as disinfectant in hospital.

# Safety Of Vanish:

HAZARDS IDENTIFICATION
Eye Damage/Irritation
Acute Toxicity, Oral
Reproductive Toxicity
Specific Target Organ Systemic Toxicity-
Single Exposure, Inhalation, Respiratory
System, Central Nervous System
HAZARD STATEMENT(S): DANGER:
Harmful if swallowed. Causes serious eye
damage.
May damage fertility or the unborn child. May
cause respiratory irritation.
May cause drowsiness or dizziness.

**http://www.vanisharabia.Com/media/5**
**vanish-liquid-white-msds.pdf/483**

# References:


1–Bauer, A. W., Kirby, W. M. M., Sherris, J. C., & Turck, M. (1966). Antibiotic susceptibility testing by a standardized single disk method. American Journal of Clinical Pathology, 45(4), 493–496

2–J. Weber, W.A. Rutala, M.B. Miller, K. Huslage, E. Sickbert–Bennett
Role of hospital surfaces in the transmission of emerging health care–associated pathogens: Norovirus, Clostridium difficile, and Acinetobacter species
Am. J. Infect. Control, 38 (2010), pp. S25–S33, 10.1016/j.ajic.2010.04.196

3–J.A. Otter, S. Yezli, J.A.G. Salkeld, G.L. French
Evidence that contaminated surfaces contribute to the transmission of hospital pathogens and an overview of strategies to address contaminated surfaces in hospital settings
Am. J. Infect. Control, 41 (2013), pp. S6–S11, 10.1016/j.ajic.2012.12.004

4–Garner JS, Favero MS. CDC Guideline for handwashing and hospital environmental control, 1985. Infect. Control 1986;7:231–43.

5–341.RussellAD,RussellNJ.Biocides:activity, action and resistance. In: Hunter PA, Darby GK, Russell NJ, eds. Fifty years of antimicrobials: past perspectives and future trends. England: Cambridge University Press, 1995:327–65.

6–342.Russell AD. Bacterial resistance to disinfectants: Present knowledge and future problems.J.Hosp.Infect.1998;43:S57–S68.

7–343 Russell AD. Plasmids and bacterial resistance to biocides. J. Appl. Microbiol. 1997;83:155–65.

8–345. Russell AD. Principles of antimicrobial activity and resistance. In: Block SS, ed. Disinfection, sterilization, and preservation. Philadelphia: Lippincott Williams & Wilkins, 2001:31–55

**9–365.**Russell AD, McDonnell G. Concentration: a major factor in studying biocidal action. J. Hosp. Infect. **2000;44:1–3.**
**10–413. 1** Russell AD. Factors influencing the efficacy of germicides. In: Rutala WA, ed. Disinfection, sterilization and antisepsis: Principles, practices, challenges, and new research. Washington DC: Association for Professionals in Infection Control and Epidemiology, **2004:162–70.**
**11–420.**Russell AD. Factors influencing the efficacy of antimicrobial agents. In: Russell AD, Hugo WB, Ayliffe GAJ, eds. Principles and practice of disinfection, preservation and sterilization. Oxford: Blackwell Science, **1999:95–123.**
**12–429.** Anderson RL, Holland BW, Carr JK, Bond WW, Favero MS. Effect of disinfectants on pseudomonads colonized on the interior surface of PVC pipes. Am. J. Public Health **1990;80:17–21**
**13–435.**Dunne WM. Bacterial adhesion: Seen any good biofilms lately? Clin. Microbiol. Rev. **2002;15:155–66.**
**14–413.**Russell AD. Factors influencing the efficacy of germicides. In: Rutala WA, ed. Disinfection, sterilization and antisepsis: Principles, practices, challenges, and new research. Washington DC: Association for Professionals in Infection Control and Epidemiology, **2004:162–70.**
**15–64.**Rice EW, Clark RM, Johnson CH. Chlorine inactivation of Escherichia coli O**157:**H**7.** Emerg. Infect. Dis. **1999;5:461–3.**
**16–**
http**://**www.vanisharabia.Com**/**media**/54 83/**vanish–liquid–white–msds.pdf