COMPOSITIONS AND METHODS FOR MULTIPURPOSE DISINFECTION AND STERILIZATION SOLUTIONS

CROSS REFERENCE

[0001] This application claims the benefit of U.S. Provisional Application No. 62/213,964 filed September 3, 2015, the content of which is hereby incorporated by reference in its entirety.

BACKGROUND

[0002] The United States Centers for Disease Control and Prevention have reported that the annual direct hospital costs of treating healthcare-associated infections in the United States range from $35.7B to $45B. The most frequent nosocomial infections are surgical site infections, hepatitis B virus infections, septicemia, gastroenteritis, hepatitis C virus infections, urinary tract infections, and meningitis. Microbial agents responsible for these infections include *Acinetobacter*, *Burkholderia cepacia*, *Clostridium difficile*, *Clostridium sordellii*, Enterobacteriaceae, hepatitis B virus, hepatitis C virus, human immunodeficiency virus, influenza viruses, *Klebsiella*, *Staphylococcus aureus Mycobacterium abscessus,* norovirus, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Mycobacterium tuberculosis*, vancomycin-intermediate *Staphylococcus aureus*, vancomycin-resistant *Staphylococcus aureus,* and vancomycin-resistant *Enterococci*.

[0003] While certain novel features of this disclosure shown and described below are pointed out in the claims, the disclosure is not intended to be limited to the details specified, since a person of ordinary skill in the relevant art will understand that various omissions, modifications, substitutions and changes in the forms and details of the disclosure illustrated and in its operation may be made without departing in any way from the spirit of the present disclosure. No feature of the disclosure is critical or essential unless it is expressly stated as being “critical” or “essential.”

SUMMARY

[0004] The present disclosure provides novel chemical formulations and compositions for multiple uses including but not limited to disinfection of contact lenses, contact cases, medical devices, other medical/paramedical devices, and dental instruments.

[0005] Disclosed herein are methods of disinfection and sterilization utilizing the presently-disclosed compositions broadly effective against multiple microbial pathogens.

[0006] Disclosed herein is a medical disinfecting composition comprising (a) a chlorite salt; (b) a quaternary ammonium salt; (c) ammonium chloride; and (d) water. In some examples of a medical disinfecting composition, the chlorite salt is an alkali metal chlorite salt. In some

examples, the alkali metal chlorite salt is sodium chlorite. In some examples of a medical disinfecting composition, the sodium chlorite is present in an amount ranging from about 0.0001% to about 0.1% (w/w). In some examples of a medical disinfecting composition, the sodium chlorite is provided as a stabilized chlorine dioxide solution. In some examples of a medical disinfecting composition, the stabilized chlorine dioxide is present in an amount ranging from about 0.005% to about 1.0% (w/w). In some examples of a medical disinfecting composition, the stabilized chlorine dioxide solution comprises chlorine dioxide. In some examples of a medical disinfecting composition, the quaternary ammonium salt comprises C12 or C14 alkyl chain. In some examples, the quaternary ammonium salt is not benzalkonium chloride. In some examples of a medical disinfecting composition, the quaternary ammonium salt is C12-C14-alkyl(ethylbenzyl)dimethylammonium chloride. In some examples of a medical disinfecting composition, the C12-C14-alkyl(ethylbenzyl)dimethylammonium chloride is present in an amount ranging from about 0.00005% to about 0.1% (w/w). In some examples of a medical disinfecting composition, the C12-C14-alkyl(ethylbenzyl)dimethylammonium chloride is present in an amount ranging from about 0.001% to about 0.1% (w/w). In some examples of a medical disinfecting composition, the ammonium chloride is present in an amount ranging from about 0.001% to about 2.0% (w/w). In some examples of a medical disinfecting composition, the composition further comprises a buffer to maintain the pH between about 7 and about 8. In some examples of a medical disinfecting composition, the pH is about 7.

[0007] Also disclosed herein is a method of disinfecting a medical device comprising contacting the medical device with a medical disinfecting composition comprising: (a) a chlorite salt; (b) a quaternary ammonium salt; (c) ammonium chloride; and (d) water. In some examples of a method of disinfecting a medical device, the chlorite salt is an alkali metal chlorite salt.

[0008] In some examples of a method of disinfecting a medical device, the alkali metal chlorite salt is sodium chlorite. In some examples of a method of disinfecting a medical device, the sodium chlorite is present in an amount ranging from about 0.0001% to about 0.1% (w/w). In some examples of a method of disinfecting a medical device, the sodium chlorite is provided as a stabilized chlorine dioxide solution. In some examples of a method of disinfecting a medical device, the stabilized chlorine dioxide is present in an amount ranging from about 0.005% to about 1.0% (w/w). In some examples of a method of disinfecting a medical device, the stabilized chlorine dioxide solution comprises chlorine dioxide.

[0009] In some examples of a method of disinfecting a medical device, the quaternary ammonium salt is not benzalkonium chloride. In some examples of a method of disinfecting a medical device, the quaternary ammonium salt is C12-C14-alkyl(ethylbenzyl)dimethylammonium chloride. In some examples of a method of disinfecting a

medical device, the C12-C14-alkyl(ethylbenzyl)dimethylammonium chloride is present in an amount ranging from about 0.00005% to about 0.1% (w/w). In some examples of a method of disinfecting a medical device, the C12-C14-alkyl(ethylbenzyl)dimethylammonium chloride is present in an amount ranging from about 0.001% to about 0.1% (w/w). In some examples of a method of disinfecting a medical device, the ammonium chloride is present in an amount ranging from about 0.001% to about 2.0% (w/w). In some examples of a method of disinfecting a medical device, the method further comprises a buffer to maintain the pH between about 7 and about 8.

[0009a] Also disclosed herein is a method of disinfecting a medical device comprising contacting the medical device with a medical disinfecting composition comprising:

(a) stabilized chlorine dioxide solution comprising a chlorite salt;

(b) a quaternary ammonium salt, consisting of C12-C14-alkyl(ethylbenzyl)dimethylammonium chloride;

(c) ammonium chloride having a formula of NH_4Cl; and

(d) water,

wherein the C12-C14-alkyl(ethylbenzyl)dimethylammonium chloride is present in an amount ranging from about 0.001% to about 0.1% w/w.

[0010] In some examples of a method of disinfecting a medical device, the medical device is in contact with a mammal tissue after contacting the medical device with a medical disinfecting composition. In some examples of a method of disinfecting a medical device, the medical device is selected from the group consisting of contact lenses, contact lens cases, surgical instruments, and dental instruments.

[0011] Other objects and advantages of this disclosure will become readily apparent from the ensuing description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The following drawings form part of the present specification and are included to further demonstrate certain aspects of the present disclosure. The disclosure may be better understood by reference to one or more of these drawings in combination with the description of specific embodiments presented herein.

[0013] FIG. 1 shows formulations of two multipurpose disinfection solutions (SOL01 and SOL02).

CLAIMS

What is claimed is:

1. A method of disinfecting a medical device comprising contacting the medical device with a medical disinfecting composition comprising:
   (a) stabilized chlorine dioxide solution comprising a chlorite salt;
   (b) a quaternary ammonium salt, consisting of C12-C14-alkyl(ethylbenzyl)dimethylammonium chloride;
   (c) ammonium chloride having a formula of NH_4Cl; and
   (d) water,
   wherein the C12-C14-alkyl(ethylbenzyl)dimethylammonium chloride is present in an amount ranging from about 0.001% to about 0.1% w/w.
2. The method of claim 1, wherein the chlorite salt is an alkali metal chlorite salt.
3. The method of claim 2, wherein the alkali metal chlorite salt is sodium chlorite.
4. The method of claim 3, wherein the sodium chlorite salt is present in an amount ranging from about 0.0001% to about 0.1% w/w.
5. The method of claim 1, wherein the stabilized chlorine dioxide solution is present in an amount ranging from about 0.005% to about 1.0% w/w.
6. The method of claim 1, wherein the ammonium chloride is present in an amount ranging from about 0.001% to about 2.0% w/w.
7. The method of claim 1, further comprising a buffer to maintain the pH between about 7 and about 8.
8. The method of claim 1, wherein the medical device is in contact with a mammal tissue after contacting the medical device with a medical disinfecting composition.
9. The method of claim 1, wherein the medical device is selected from the group consisting of contact lenses, contact lens cases, surgical instruments, and dental instruments.