CLAIMS

What is claimed is:

~~1. A method of treating a subject for infection with a Severe Acute Respiratory Syndrome Coronavirus (SARSr-CoV), comprising:~~

~~administering a therapeutically effective amount of a nitric oxide releasing solution (NORS) to the subject.~~

~~2. The method of claim 1, further comprising:~~

~~administering the NORS to the subject when the subject is asymptomatic.~~

~~3. The method of claim 1, further comprising:~~

~~administering the NORS to the subject within a selected number of days of an identified first-person exposure.~~

~~4. The method of claim 1, further comprising:~~

~~administering the NORS to the subject without an identified first-person exposure.~~

~~5. The method of claim 1, further comprising:~~

~~administering the NORS to the subject when displaying mild symptoms of SARS-CoV-2 infection.~~

~~6. The method of claim 1, further comprising:~~

~~administering the NORS to the subject when displaying moderate symptoms of SARS-CoV-2 infection.~~

~~7. The method of claim 1, further comprising:~~

~~administering the NORS to the subject when displaying severe symptoms of SARS-CoV-2 infection.~~

8. The method of claim 1, further comprising:

administering the NORS to the subject when displaying critical symptoms of SARS-CoV-2 infection.

9. The method of claim 1, further comprising:

administering the NORS to the subject according to a dosage regimen of 1 to 6 times per day for a duration of from about a single day to about 2 weeks.

10. The method of claim 1, further comprising:

administering the NORS to the subject at a single dose of from about 300 ul of NORS to about 700 ul of NORS.

11. The method of claim 1, further comprising:

administering the NORS to the subject at a single dose of from about 400 ul of NORS to about 600 ul of NORS.

12. The method of claim 1, further comprising:

administering the NORS to the subject at a daily dose of from about 1500 ul of NORS to about 4200 ul of NORS.

13. The method of claim 1, further comprising:

administering the NORS to the subject at a daily dose of from about 2000 ul of NORS to about 3600 ul of NORS.

14. The method of claim 1, wherein the therapeutically effective amount of the NORS reduces a viral RNA load compared to a baseline level by greater than one or more of: 80%, 90%, 95%, or 99% after a treatment duration of one or more of: 1 day, 2 days, 3 days, 4 days, 5 days, or 6 days.

15. The method of claim 1, wherein the therapeutically effective amount of the NORS:

provides a low pH that reduces SARS-CoV-2 viral load, or

provides a physical barrier over epithelial cells of the subject that prevents SARS-CoV-2 access to host cells of the subject, or

provides an angiotensin-converting enzyme 2 (ACE-2) receptor blocking agent.

16. The method of claim 1, wherein the NORS is administered to an afflicted situs.

17. The method of claim 16, wherein the afflicted situs is an upper respiratory tract of the subject.

18. The method of claim 1, wherein the afflicted situs is a mucosal membrane.

19. The method of claim 18, wherein the mucosal membrane is a subject's nasal passage or sinus and the NORS is administered as a sprayed solution or as a lavage.

20. The method of claim 18, wherein the mucosal membrane is a subject's mouth or throat and the NORS is administered as a gargle solution.

21. The method of claim 1, wherein the virus is a SARS-CoV-2 virus or a variant thereof.

22. The method of claim 21, wherein the SARS-Co-V-2 virus or the variant thereof is one or more of: Lineage A, Cluster 5, Lineage B.1.1.7, B.1.1.7 with E484K, Lineage B.1.1.207, Lineage B.1.1.317, Lineage B.1.1.318, Lineage B.1.351, Lineage B.1.429/CAL.20C, Lineage B.1.525, Lineage P.1, Lineage B.1.427, Lineage B.1.526, Lineage P.2, or a combination thereof.

23. The method of claim 1, wherein the therapeutically effective amount of the NORS is substantially equally effective for treating one or more of: Lineage A, Cluster 5, Lineage B.1.1.7, B.1.1.7 with E484K, Lineage B.1.1.207, Lineage B.1.1.317, Lineage B.1.1.318, Lineage B.1.351, Lineage B.1.429/CAL.20C, Lineage B.1.525, Lineage P.1, Lineage B.1.427, Lineage B.1.526, Lineage P.2, or a combination thereof.

24. A method of minimizing subject-to-subject transmissibility for a pathogen comprising:

administering a therapeutically effective amount of a nitric oxide releasing solution (NORS) to the subject.

25. The method of claim 24, further comprising:

administering the NORS to the subject before or after exposure of the subject to the pathogen.

26. The method of claim 24, further comprising:

administering the NORS to the subject before or after exposure of the subject to a person displaying symptoms of the pathogen.

27. The method of claim 24, wherein the pathogen is a Severe Acute Respiratory Syndrome Coronavirus (SARSr-CoV) or a variant thereof.

28. The method of claim 27, wherein the Severe Acute Respiratory Syndrome Coronavirus (SARSr-CoV) is a SARS-CoV-2 virus including one or more of: Lineage A, Cluster 5, Lineage B.1.1.7, B.1.1.7 with E484K, Lineage B.1.1.207, Lineage B.1.1.317, Lineage B.1.1.318, Lineage B.1.351, Lineage B.1.429/CAL.20C, Lineage B.1.525, Lineage P.1, Lineage B.1.427, Lineage B.1.526, Lineage P.2, or a combination thereof.

29. The method of claim 24, wherein the therapeutically effective amount of the NORS is substantially equally effective for minimizing subject-to-subject transmissibility for a a Severe Acute Respiratory Syndrome Coronavirus (SARSr-CoV) or a variant thereof including one or more of: Lineage A, Cluster 5, Lineage B.1.1.7, B.1.1.7 with E484K, Lineage B.1.1.207, Lineage B.1.1.317, Lineage B.1.1.318, Lineage B.1.351, Lineage B.1.429/CAL.20C, Lineage B.1.525, Lineage P.1, Lineage B.1.427, Lineage B.1.526, Lineage P.2, or a combination thereof.

30. The method of claim 24, wherein the therapeutically effective amount of the NORS reduces a viral RNA load compared to a baseline level by greater than one or more of: 80%, 90%, 95%, or 99% after a treatment duration of one or more of: 1 day, 2 days, 3 days, 4 days, 5 days, or 6 days.

31. The method of claim 24, wherein the therapeutically effective amount of the NORS:

provides a low pH that reduces SARS-CoV-2 viral load, or

~~provides a physical barrier over epithelial cells of the subject that prevents SARS-CoV-2 access to host cells of the subject, or~~

~~provides an angiotensin-converting enzyme 2 (ACE-2) receptor blocking agent.~~

~~32. The method of claim 24, wherein the NORS is administered to a mucosal membrane.~~

~~33. The method of claim 32, wherein the mucosal membrane is a subject's nasal passage or sinus and the NORS is administered as a sprayed solution or as a lavage.~~

~~34. The method of claim 32, wherein the mucosal membrane is a subject's mouth or throat and the NORS is administered as a gargle solution.~~

~~35. A method of treating a subject for infection of a pathogen in an upper respiratory tract comprising:~~

~~administering a therapeutically effective amount of a nitric oxide releasing solution (NORS) to the subject as a spray having an average droplet volume which contains treatment within the upper respiratory tract.~~

~~36. The method of claim 35, further comprising:~~

~~providing a median droplet size (Dv50) of greater than one or more of 100 μm, 150 μm, 200 μm, 250 μm, 300 μm, 350 μm, 400 μm, 450 μm, 500 μm, 550 μm, or 600 μm when measured a 30 mm or 60 mm distance from actuation.~~

~~37. The method of claim 35, further comprising:~~

~~providing a percentage of spray by volume at droplet sizes of less than 10 μm (% < 10 μm) of less than one or more of: 0.5%, 0.4%, 0.3%, 0.2%, or 0.1% when measured a 30 mm or 60 mm distance from actuation.~~

~~38. The method of claim 35, further comprising:~~

~~providing a percentage of spray by volume at droplet sizes of less than 5 μm (% < 5 μm) of less than one or more of: 0.5%, 0.4%, 0.3%, 0.2%, or 0.1% when measured a 30 mm or 60 mm distance from actuation.~~

~~39. The method of claim 35, further comprising:~~

~~providing a 10th percentile by volume of spray (Dv(10)) of greater than one or more of 100 μm, 150 μm, 200 μm, 250 μm, 300 μm, 350 μm, or 400 μm when measured a 30 mm or 60 mm distance from actuation.~~

~~40. The method of claim 35, further comprising:~~

~~providing a 90th percentile by volume of spray (Dv(90)) of greater than one or more of 500 μm, 550 μm, 600 μm, 650 μm, 700 μm, 750 μm, 800 μm, 850 μm, 900 μm, 950 μm, or 1000 μm when measured a 30 mm or 60 mm distance from actuation.~~

~~41. The method of claim 35, further comprising:~~

~~providing a droplet size distribution of about 0.5 to about 2.0, wherein the droplet size distribution is: (Dv(90) – Dv(10))/Dv(50).~~

~~42.~~ 1. A nitric oxide releasing solution (NORS) comprising:

at least one nitric oxide releasing compound and at least one acidifying agent, wherein the NORS releases a therapeutically effective amount as a spray having an average droplet volume which contains treatment within an upper respiratory tract.

~~43.~~ 2. The solution of claim ~~42~~1, wherein the NORS provides a median droplet size (Dv50) of greater than one or more of 100 μm, 150 μm, 200 μm, 250 μm, 300 μm, 350 μm, 400 μm, 450 μm, 500 μm, 550 μm, or 600 μm when measured a 30 mm or 60 mm distance from actuation.

~~44.~~ 3. The solution of claim ~~42~~1, wherein the NORS provides a percentage of spray by volume at droplet sizes of less than 10 μm (% < 10 μm) of less than one or more of: 0.5%, 0.4%, 0.3%, 0.2%, or 0.1% when measured a 30 mm or 60 mm distance from actuation.

~~45.~~ 4. The solution of claim ~~42~~1, wherein the NORS provides a percentage of spray by volume at droplet sizes of less than 5 μm (% < 5 μm) of less than one or

more of: 0.5%, 0.4%, 0.3%, 0.2%, or 0.1% when measured a 30 mm or 60 mm distance from actuation.

~~46.~~ 5. The solution of claim ~~42~~1, wherein the NORS provides a 10^{th} percentile by volume of spray (Dv(10)) of greater than one or more of 100 μm, 150 μm, 200 μm, 250 μm, 300 μm, 350 μm, or 400 μm when measured a 30 mm or 60 mm distance from actuation.

~~47.~~ 6. The solution of claim ~~42~~1, wherein the NORS provides a 90^{th} percentile by volume of spray (Dv(90)) of greater than one or more of 500 μm, 550 μm, 600 μm, 650 μm, 700 μm, 750 μm, 800 μm, 850 μm, 900 μm, 950 μm, or 1000 μm when measured a 30 mm or 60 mm distance from actuation.

~~48.~~ 7. The solution of claim ~~42~~1, wherein the NORS provides a droplet size distribution of about 0.5 to about 2.0, wherein the droplet size distribution is: (Dv(90) – Dv(10))/Dv(50).

~~49.~~ 8. The solution of claim ~~42~~1, wherein the at least one nitric oxide releasing compound is selected from the group consisting of a nitrite, a salt thereof, and any combinations thereof.

~~50.~~ 9. The solution of claim ~~42~~1, wherein the at least one acidifying agent is an acid.

~~51.~~ 10. A composition for use in treating a subject for infection with a Severe Acute Respiratory Syndrome Coronavirus (SARSr-CoV), wherein said use comprises:

administering a therapeutically effective amount of nitric oxide releasing solution (NORS) to the subject.

~~52.~~ 11. A composition for use in minimizing subject-to-subject transmissibility for a pathogen, wherein said use comprises:

administering a therapeutically effective amount of nitric oxide releasing solution (NORS) to the subject.

~~53.~~ 12. A composition for use in treating a subject for infection of a pathogen in an upper respiratory tract, wherein said use comprises:

administering a therapeutically effective amount of nitric oxide releasing solution (NORS) to the subject as a spray having an average droplet volume which contains treatment within the upper respiratory tract.

~~54. Use of a pharmaceutical composition for the manufacture of a medicament for treating a subject for infection with a Severe Acute Respiratory Syndrome Coronavirus (SARSr-CoV), wherein said use comprises:~~

~~administering a therapeutically effective amount of nitric oxide releasing solution (NORS) to the subject.~~

~~55. Use of a pharmaceutical composition for the manufacture of a medicament for minimizing subject-to-subject transmissibility for a pathogen, wherein said use comprises:~~

~~administering a therapeutically effective amount of nitric oxide releasing solution (NORS) to the subject.~~

~~56. Use of a pharmaceutical composition for the manufacture of a medicament for treating a subject for infection of a pathogen in an upper respiratory tract, wherein said use comprises:~~

~~administering a therapeutically effective amount of nitric oxide releasing solution (NORS) to the subject as a spray having an average droplet volume which contains treatment within the upper respiratory tract.~~

~~57. The method of claim 24, wherein the NORS comprises a nitric oxide releasing compound that comprises sodium nitrite, potassium nitrite, barium nitrite, calcium nitrite, nitrite orotate, amyl nitrite, or a combination thereof.~~

~~58. The method of claim 24, wherein the NORS comprises an acidifying agent that comprises ascorbic acid, ascorbyl palmitate, salicylic acid, malic acid, lactic acid, citric acid, formic acid, benzoic acid, tartaric acid, hydrochloric acid, sulfuric acid, and phosphoric acid acetic acid, or a combination thereof.~~

59. The method of claim 24, wherein the NORS comprises a carrier comprising water, saline, or a combination thereof.

60. The method of claim 24, the NORS comprises a preservative comprising ascorbic acid, acetylcysteine, bisulfite, metabisulfite, monothioglycerol, phenol, meta-cresol, benzyl alcohol, methyl paraben, propyl paraben, butyl paraben, benzalkonium chloride, benzethonium chloride, butylated hydroxyl toluene, myristyl gamma-picolimium chloride, 2-phenoxyethanol, phenyl mercuric nitrate, chlorobutanol, thimerosal, tocopherols, or a combination thereof.

61. The method of claim 24, the NORS comprises a tonicity agent comprising sodium chloride, potassium chloride, calcium chloride, magnesium chloride, mannitol, sorbitol, dextrose, glycerin, propylene glycol, ethanol, trehalose, phosphate-buffered saline (PBS), Dulbecco's PBS, Alsever's solution, Tris-buffered saline (TBS), water, balanced salt solutions (BSS), such as Hank's BSS, Earle's BSS, Grey's BSS, Puck's BSS, Simm's BSS, Tyrode's BSS, and BSS Plus, or a combination thereof.

62. The method of claim 24, wherein a tonicity of the NORS is from about 250 milliosmoles/liter (mOsm/L) to about 350 mOsm/L.

63. The method of claim 24, wherein the NORS comprises a thickener comprising polyacrylic acids, gelatin, pectin, tragacanth, methyl cellulose, hydroxylethylcellulose, hydroxypropylcellulose, HPMC, CMC, alginate, starch, polyvinyl alcohol, polyvinyl pyrrolidone, co-polymers of polyoxyethylene and polyoxypropylene, polyethylene glycol, or a combination thereof.

64. The method of claim 24, wherein the NORS is formulated as a lavage.

65. The method of claim 24, wherein the NORS is formulated as a lavage in an amount of from about 50 mL to about 500 mL.

66. The method of claim 24, wherein the NORS is formulated as a lavage in an amount of from about 100 mL to about 400 mL.

67. The method of claim 24, wherein the NORS is formulated as a lavage in an amount of from about 150 mL to about 350 mL.

68. The method of claim 24, wherein the NORS is formulated as a gargle.

69. The method of claim 24, wherein the NORS is formulated as a gargle in an amount of from about 5 mL to about 50 mL.

70. The method of claim 24, wherein the NORS is formulated as a gargle in an amount of from about 10 mL to about 40 mL.

71. The method of claim 24, wherein the NORS is formulated as a gargle in an amount of from about 10 mL to about 30 mL.

72. The method of claim 24, further comprising activating the NORS by mixing an acidifying agent with a nitrite solution.

73. The method of claim 24, further comprising activating the NORS by mixing an acidifying agent with a nitrite solution just prior to administration.

74. The method of claim 24, further comprising activating the NORS by lowering a pH of a nitrite solution just prior to administration.

75. The method of claim 24, further comprising activating the NORS by lowering a pH of a nitrite solution to the pH of from about 1.0 to about 4.0 just prior to administration.

76. The method of claim 24, further comprising activating the NORS by lowering a pH of a nitrite solution to the pH of from about 3.0 to about 4.0 just prior to administration.

77. The method of claim 24, further comprising activating the NORS by lowering a pH of a nitrite solution to the pH of from about 3.2 to about 4.0 just prior to administration.

78. The method of claim 24, further comprising activating the NORS by lowering a pH of a nitrite solution to the pH of from about 3.4 to about 4.0 just prior to administration.

79. The method of claim 24, further comprising activating the NORS by lowering a pH of a nitrite solution to the pH of from about 3.6 to about 4.0 just prior to administration.

80. The method of claim 24, wherein the NORS releases a concentration of NO of from about 100 ppb and 1000 ppm.

81. The method of claim 24, wherein the NORS releases a concentration of NO of from about 100 ppb and 1000 ppm.

82. The method of claim 24, wherein the NORS releases NO for a period of from about 1 minute and 24 hours.

83. The method of claim 24, wherein the NORS releases NO for a period of at least 1 hour.

84. The method of claim 24, wherein the NORS releases NO for a period of from about 1 minute and 1 hour.

85. The method of claim 24, wherein the NORS has a pH of less than about 4.0.

86. The method of claim 24, wherein the NORS has a pH of between about 3.0 and about 4.0.

87. The method of claim 24, wherein the NORS has a concentration of nitric oxide releasing compound of not greater than 0.5% w/v.

88. The method of claim 24, wherein the NORS has a concentration of nitric oxide releasing compound of from about 0.07% w/v to about 0.5% w/v.

89. The method of claim 24, wherein the NORS has a concentration of acidifying agent of from about 0.07% w/v to about 0.5% w/v.

90. The method of claim 24, wherein the NORS has a concentration of acidifying agent of about 0.2% w/v.

91. The method of claim 24, wherein the NORS has a concentration of acidifying agent of about 0.5% w/v.

92. The method of claim 24, wherein the NORS has a concentration of acidifying agent of not greater than 0.5% w/v.

93. The method of claim 24, wherein the NORS has a pH of from about 3.7 to about 4.0 and wherein the composition has a concentration of nitric oxide releasing compound of about 0.41% to about 0.5% w/v.

94. The method of claim 24, wherein the NORS has a pH of from about 3.6 to about 3.7 and wherein the composition has a concentration of nitric oxide releasing compound of from about 0.07% w/v to about 0.5% w/v.

95. The method of claim 24, wherein the NORS has a pH of from about 3.2 to about 3.6 and wherein the composition has a concentration of nitric oxide releasing compound of not greater than 0.41% w/v.

96. The method of claim 24, wherein the NORS has a pH of from about 3.0 to about 3.2 and wherein the composition has a concentration of nitric oxide releasing compound of about 0.41% to about 0.5% w/v.

97. The method of claim 24, wherein NORS comprises a nitric oxide releasing compound and an acidifying agent, wherein when the nitric oxide releasing compound

and the acidifying agent are mixed at a ratio of about 1:1, the NORS produces an NO concentration of from about 0.7 ppm to about 4 ppm.

98. The method of claim 24, wherein NORS comprises a nitric oxide releasing compound and an acidifying agent, wherein when the nitric oxide releasing compound and the acidifying agent are mixed at a ratio of about 1:1, the NORS produces an area under the curve after 2 minutes of from about from 0.7 ppm*min to about 2.0ppm*min.

99. The method of claim 24, wherein NORS comprises a nitric oxide releasing compound and an acidifying agent, wherein when the nitric oxide releasing compound and the acidifying agent are mixed at a ratio of about 1:1, the NORS produces an NO concentration of from about 1.4 ppm to about 8 ppm.

100. The method of claim 24, wherein NORS comprises a nitric oxide releasing compound and an acidifying agent, wherein when the nitric oxide releasing compound and the acidifying agent are mixed at a ratio of about 1:1, the NORS produces an area under the curve after 2 minutes of from about from 1.4 ppm*min to about 4.0ppm*min.

101. A composition, comprising:

an effective amount of a nitric oxide (NO) releasing solution (NORS) formulated as a lavage, as a gargle, or as a spray, said spray having an average droplet volume which substantially contains NO release within an upper respiratory tract.

102. The composition of claim 101, wherein the amount of NO release is effective against a virus.

103. The composition of claim 102, wherein the virus is a SARS-CoV-2 virus.

104. The composition of claim 101, wherein the effective amount of the NORS is provided 1 to 6 times per day for a duration of from a single day to 2 weeks, wherein the effective amount is effective against a SARS-CoV-2 virus.

105. The composition of claim 101, wherein the effective amount of the NORS is from about 300 ul of NORS to about 700 ul of NORS.

106. The composition of claim 101, wherein the effective amount of the NORS is from about 400 ul of NORS to about 600 ul of NORS.

107. The composition of claim 101, wherein the effective amount of the NORS is from about 1500 ul of NORS to about 4200 ul of NORS.

108. The composition of claim 101, wherein the effective amount of the NORS is from about 2000 ul of NORS to about 3600 ul of NORS.

109. The composition of claim 101, wherein the effective amount of the NORS reduces a viral RNA load compared to a baseline level by greater than one or more of: 80%, 90%, 95%, or 99% after a duration of one or more of: 1 day, 2 days, 3 days, 4 days, 5 days, or 6 days.

110. The composition of claim 101, wherein the effective amount of the NORS:

provides a low pH that reduces SARS-CoV-2 viral load, or

provides a physical barrier over epithelial cells that prevents SARS-CoV-2 access to host cells, or

provides an angiotensin-converting enzyme 2 (ACE-2) receptor blocking agent.

111. The composition of claim 101, wherein the NORS is formulated as the spray or as the lavage and substantially confines the NO release to a nasal passage or sinus of the upper respiratory tract.

112. The composition of claim 101, wherein the NORS is formulated as the gargle and substantially confines the NO release to a mouth or throat of the upper respiratory tract.

~~113. The composition of claim 101, wherein the effective amount of the NORS provides an amount of NO release that is effective against a SARS-CoV-2 virus or a variant thereof.~~

~~114. The composition of claim 113, wherein the SARS-Co-V-2 virus or the variant thereof is one or more of: Lineage A, Cluster 5, Lineage B.1.1.7, B.1.1.7 with E484K, Lineage B.1.1.207, Lineage B.1.1.317, Lineage B.1.1.318, Lineage B.1.351, Lineage B.1.429/CAL.20C, Lineage B.1.525, Lineage P.1, Lineage B.1.427, Lineage B.1.526, Lineage P.2, or a combination thereof.~~

~~115. The composition of claim 113, wherein the effective amount of the NORS is substantially equally effective against one or more of: Lineage A, Cluster 5, Lineage B.1.1.7, B.1.1.7 with E484K, Lineage B.1.1.207, Lineage B.1.1.317, Lineage B.1.1.318, Lineage B.1.351, Lineage B.1.429/CAL.20C, Lineage B.1.525, Lineage P.1, Lineage B.1.427, Lineage B.1.526, Lineage P.2, or a combination thereof.~~

~~116. A method of minimizing transmissibility for a pathogen comprising:~~

~~providing a nitric oxide (NO) releasing solution (NORS) comprising a combination of at least one nitric oxide releasing compound and at least one acidifying agent, wherein the NORS is formulated as a lavage, as a gargle, or as a spray, said spray having an average droplet volume that is substantially contained within an upper respiratory tract.~~

~~117. The method of claim 116, wherein an effective amount of the NORS provides an amount of NO release to the upper respiratory tract before or after presence of the pathogen.~~

~~118. The method of claim 116, wherein the pathogen is a Severe Acute Respiratory Syndrome Coronavirus (SARSr-CoV) or a variant thereof.~~

~~119. The method of claim 118, wherein the Severe Acute Respiratory Syndrome Coronavirus (SARSr-CoV) is a SARS-CoV-2 virus including one or more of: Lineage A, Cluster 5, Lineage B.1.1.7, B.1.1.7 with E484K, Lineage B.1.1.207, Lineage B.1.1.317, Lineage B.1.1.318, Lineage B.1.351, Lineage B.1.429/CAL.20C, Lineage~~

~~B.1.525, Lineage P.1, Lineage B.1.427, Lineage B.1.526, Lineage P.2, or a combination thereof.~~

~~120. The method of claim 118, wherein an effective amount of the NORS is substantially equally effective for minimizing transmissibility for a Severe Acute Respiratory Syndrome Coronavirus (SARSr-CoV) or a variant thereof including one or more of: Lineage A, Cluster 5, Lineage B.1.1.7, B.1.1.7 with E484K, Lineage B.1.1.207, Lineage B.1.1.317, Lineage B.1.1.318, Lineage B.1.351, Lineage B.1.429/CAL.20C, Lineage B.1.525, Lineage P.1, Lineage B.1.427, Lineage B.1.526, Lineage P.2, or a combination thereof.~~

~~121. The method of claim 116, wherein an effective amount of the NORS reduces a viral RNA load compared to a baseline level by greater than one or more of: 80%, 90%, 95%, or 99% after a duration of one or more of: 1 day, 2 days, 3 days, 4 days, 5 days, or 6 days.~~

~~122. The method of claim 116, wherein an effective amount of the NORS:~~

~~provides a low pH that reduces SARS-CoV-2 viral load, or~~

~~provides a physical barrier over epithelial cells that prevents SARS-CoV-2 access to host cells, or~~

~~provides an angiotensin-converting enzyme 2 (ACE-2) receptor blocking agent.~~

~~123. The composition of claim 101, wherein the NORS is formulated as the spray.~~

~~124. The composition of claim 123, wherein the NORS is formulated as the spray having a median droplet size (Dv50) of greater than one or more of 100 μm, 150 μm, 200 μm, 250 μm, 300 μm, 350 μm, 400 μm, 450 μm, 500 μm, 550 μm, or 600 μm when measured a 30 mm or 60 mm distance from actuation.~~

~~125. The composition of claim 123, wherein the NORS is formulated as the spray having a percentage of spray by volume at droplet sizes of less than 10 μm (% < 10~~

~~μm) of less than one or more of: 0.5%, 0.4%, 0.3%, 0.2%, or 0.1% when measured a 30 mm or 60 mm distance from actuation.~~

~~126. The composition of claim 123, wherein the NORS is formulated as the spray having a percentage of spray by volume at droplet sizes of less than 5 μm (% < 5 μm) of less than one or more of: 0.5%, 0.4%, 0.3%, 0.2%, or 0.1% when measured a 30 mm or 60 mm distance from actuation.~~

~~127. The composition of claim 123, wherein the NORS is formulated as the spray having a 10th percentile by volume of spray (Dv(10)) of greater than one or more of 100 μm, 150 μm, 200 μm, 250 μm, 300 μm, 350 μm, or 400 μm when measured a 30 mm or 60 mm distance from actuation.~~

~~128. The composition of claim 123, wherein the NORS is formulated as the spray having a 90th percentile by volume of spray (Dv(90)) of greater than one or more of 500 μm, 550 μm, 600 μm, 650 μm, 700 μm, 750 μm, 800 μm, 850 μm, 900 μm, 950 μm, or 1000 μm when measured a 30 mm or 60 mm distance from actuation.~~

~~129. The composition of claim 123, wherein the NORS is formulated as the spray having a droplet size distribution of about 0.5 to about 2.0, wherein the droplet size distribution is: (Dv(90) – Dv(10))/Dv(50).~~

~~130. A nitric oxide releasing solution (NORS) comprising:~~

~~at least one nitric oxide (NO) releasing compound and at least one acidifying agent, wherein an effective amount of the NORS is formulated to substantially contain NO release within an upper respiratory tract.~~

~~131. The solution of claim 130, wherein the NORS is formulated as a spray having a median droplet size (Dv50) of greater than one or more of 100 μm, 150 μm, 200 μm, 250 μm, 300 μm, 350 μm, 400 μm, 450 μm, 500 μm, 550 μm, or 600 μm when measured a 30 mm or 60 mm distance from actuation.~~

~~132. The solution of claim 130, wherein the NORS is formulated as a spray having a percentage of spray by volume at droplet sizes of less than 10 μm (% < 10 μm) of less than one or more of: 0.5%, 0.4%, 0.3%, 0.2%, or 0.1% when measured a 30 mm or 60 mm distance from actuation.~~

~~133. The solution of claim 130, wherein the NORS is formulated as a spray having a percentage of spray by volume at droplet sizes of less than 5 μm (% < 5 μm) of less than one or more of: 0.5%, 0.4%, 0.3%, 0.2%, or 0.1% when measured a 30 mm or 60 mm distance from actuation.~~

~~134. The solution of claim 130, wherein the NORS is formulated as a spray having a 10th percentile by volume of spray (Dv(10)) of greater than one or more of 100 μm, 150 μm, 200 μm, 250 μm, 300 μm, 350 μm, or 400 μm when measured a 30 mm or 60 mm distance from actuation.~~

~~135. The solution of claim 130, wherein the NORS is formulated as a spray having a 90th percentile by volume of spray (Dv(90)) of greater than one or more of 500 μm, 550 μm, 600 μm, 650 μm, 700 μm, 750 μm, 800 μm, 850 μm, 900 μm, 950 μm, or 1000 μm when measured a 30 mm or 60 mm distance from actuation.~~

~~136. The solution of claim 130, wherein the NORS is formulated as a spray having a droplet size distribution of about 0.5 to about 2.0, wherein the droplet size distribution is: (Dv(90) – Dv(10))/Dv(50).~~

~~137. The solution of claim 130, wherein the at least one nitric oxide releasing compound is selected from the group consisting of a nitrite, a salt thereof, and any combinations thereof.~~

~~138. The solution of claim 130, wherein the at least one acidifying agent is an acid.~~

~~139. The solution of claim 130, wherein the nitric oxide releasing compound comprises sodium nitrite, potassium nitrite, barium nitrite, calcium nitrite, nitrite orotate, amyl nitrite, or a combination thereof.~~

~~140. The solution of claim 130, wherein the acidifying agent comprises ascorbic acid, ascorbyl palmitate, salicylic acid, malic acid, lactic acid, citric acid, formic acid, benzoic acid, tartaric acid, hydrochloric acid, sulfuric acid, and phosphoric acid acetic acid, or a combination thereof.~~

~~141. The composition of claim 101 or the solution of claim 130, further comprising a carrier comprising water, saline, or a combination thereof.~~

~~142. The composition of claim 101 or the solution of claim 130, further comprising a preservative comprising ascorbic acid, acetylcysteine, bisulfite, metabisulfite, monothioglycerol, phenol, meta-cresol, benzyl alcohol, methyl paraben, propyl paraben, butyl paraben, benzalkonium chloride, benzethonium chloride, butylated hydroxyl toluene, myristyl gamma-picolimium chloride, 2-phenoxyethanol, phenyl mercuric nitrate, chlorobutanol, thimerosal, tocopherols, or a combination thereof.~~

~~143. The composition of claim 101 or the solution of claim 130, further comprising a tonicity agent comprising sodium chloride, potassium chloride, calcium chloride, magnesium chloride, mannitol, sorbitol, dextrose, glycerin, propylene glycol, ethanol, trehalose, phosphate-buffered saline (PBS), Dulbecco's PBS, Alsever's solution, Tris-buffered saline (TBS), water, balanced salt solutions (BSS), such as Hank's BSS, Earle's BSS, Grey's BSS, Puck's BSS, Simm's BSS, Tyrode's BSS, and BSS Plus, or a combination thereof.~~

~~144. The composition of claim 101 or the solution of claim 130, wherein a tonicity of the composition is from about 250 milliosmoles/liter (mOsm/L) to about 350 mOsm/L.~~

~~145. The composition of claim 101 or the solution of claim 130, further comprising a thickener comprising polyacrylic acids, gelatin, pectin, tragacanth, methyl cellulose, hydroxylethylcellulose, hydroxypropylcellulose, HPMC, CMC, alginate, starch, polyvinyl alcohol, polyvinyl pyrrolidone, co-polymers of polyoxyethylene and polyoxypropylene, polyethylene glycol, or a combination thereof.~~

146. A method for enhancing the efficacy of a nitric oxide releasing solution (NORS) for reducing a viral load for a pathogen, comprising:

providing an effective amount of NORS as a spray, lavage, or gargle that substantially contains nitric oxide release within an upper respiratory tract.

147. The method of claim 146, wherein the effective amount of the NORS reduces a viral RNA load compared to a baseline level by greater than one or more of: 80%, 90%, 95%, or 99% after a duration of one or more of: 1 day, 2 days, 3 days, 4 days, 5 days, or 6 days.

148. The method of claim 146, wherein the effective amount of the NORS:

provides a low pH that reduces SARS-CoV-2 viral load, or

provides a physical barrier over epithelial cells that prevents SARS-CoV-2 access to host cells, or

provides an angiotensin-converting enzyme 2 (ACE-2) receptor blocking agent.

149. The method of claim 146, wherein the pathogen is a Severe Acute Respiratory Syndrome Coronavirus (SARSr-CoV) or a variant thereof.

150. The composition of claim 101 or the solution of claim 130, wherein the NORS is formulated as a lavage in an amount of from about 50 mL to about 500 mL.

151. The composition of claim 101 or the solution of claim 130, wherein the NORS is formulated as a lavage in an amount of from about 100 mL to about 400 mL.

152. The composition of claim 101 or the solution of claim 130, wherein the NORS is formulated as a lavage in an amount of from about 150 mL to about 350 mL.

153. The composition of claim 101 or the solution of claim 130, wherein the NORS is formulated as a gargle in an amount of from about 5 mL to about 50 mL.

154. The composition of claim 101 or the solution of claim 130, wherein the NORS is formulated as a gargle in an amount of from about 10 mL to about 40 mL.

155. The composition of claim 101 or the solution of claim 130, wherein the NORS is formulated as a gargle in an amount of from about 10 mL to about 30 mL.

156. The composition of claim 123, wherein the spray is dispensed from a nasal spray bottle.

157. The composition of claim 101 or the solution of claim 130, wherein the NORS is formulated as a lavage.

158. The composition of claim 101 or the solution of claim 130, wherein the NORS is formulated as a gargle.

159. A composition comprising a nitric oxide releasing solution (NORS) comprising:

at least one nitric oxide (NO) releasing compound and at least one acidifying agent, wherein an effective amount of the NORS is formulated to substantially contain NO release within an upper respiratory tract.

160. The composition of claim 159, wherein the NORS releases the effective amount of the NORS as a spray having an average droplet volume which contains the NO release within the upper respiratory tract.

161. The composition of claim 159, wherein the NORS is formulated as a spray having a median droplet size (Dv50) of greater than one or more of 100 μm, 150 μm, 200 μm, 250 μm, 300 μm, 350 μm, 400 μm, 450 μm, 500 μm, 550 μm, or 600 μm when measured a 30 mm or 60 mm distance from actuation.

162. The composition of claim 159, wherein the NORS is formulated as a spray having a percentage of spray by volume at droplet sizes of less than 10 μm (% < 10 μm) of less than one or more of: 0.5%, 0.4%, 0.3%, 0.2%, or 0.1% when measured a 30 mm or 60 mm distance from actuation.

~~163. The composition of claim 159, wherein the NORS is formulated as a spray having a percentage of spray by volume at droplet sizes of less than 5 μm (% < 5 μm) of less than one or more of: 0.5%, 0.4%, 0.3%, 0.2%, or 0.1% when measured a 30 mm or 60 mm distance from actuation.~~

~~164. The composition of claim 159, wherein the NORS is formulated as a spray having a 10th percentile by volume of spray (Dv(10)) of greater than one or more of 100 μm, 150 μm, 200 μm, 250 μm, 300 μm, 350 μm, or 400 μm when measured a 30 mm or 60 mm distance from actuation.~~

~~165. The composition of claim 159, wherein the NORS is formulated as a spray having a 90th percentile by volume of spray (Dv(90)) of greater than one or more of 500 μm, 550 μm, 600 μm, 650 μm, 700 μm, 750 μm, 800 μm, 850 μm, 900 μm, 950 μm, or 1000 μm when measured a 30 mm or 60 mm distance from actuation.~~

~~166. The composition of claim 159, wherein the NORS is formulated as a spray having a droplet size distribution of about 0.5 to about 2.0, wherein the droplet size distribution is: (Dv(90) – Dv(10))/Dv(50).~~

~~167. The composition of 159, wherein the at least one nitric oxide releasing compound is selected from the group consisting of a nitrite, a salt thereof, and any combinations thereof.~~

~~168. The composition of 159, wherein the at least one acidifying agent is an acid.~~

~~169. The composition of 159, wherein the NORS comprises a nitric oxide releasing compound that comprises sodium nitrite, potassium nitrite, barium nitrite, calcium nitrite, nitrite orotate, amyl nitrite, or a combination thereof.~~

~~170. The composition of 159, wherein the NORS comprises an acidifying agent that comprises ascorbic acid, ascorbyl palmitate, salicylic acid, malic acid, lactic acid, citric acid, formic acid, benzoic acid, tartaric acid, hydrochloric acid, sulfuric acid, and phosphoric acid acetic acid, or a combination thereof.~~

~~171. The composition of 159, wherein the NORS comprises a carrier comprising water, saline, or a combination thereof.~~

~~172. The composition of 159, wherein the NORS comprises a preservative comprising ascorbic acid, acetylcysteine, bisulfite, metabisulfite, monothioglycerol, phenol, meta-cresol, benzyl alcohol, methyl paraben, propyl paraben, butyl paraben, benzalkonium chloride, benzethonium chloride, butylated hydroxyl toluene, myristyl gamma-picolimium chloride, 2-phenoxyethanol, phenyl mercuric nitrate, chlorobutanol, thimerosal, tocopherols, or a combination thereof.~~

~~173. The composition of 159, wherein the NORS comprises a tonicity agent comprising sodium chloride, potassium chloride, calcium chloride, magnesium chloride, mannitol, sorbitol, dextrose, glycerin, propylene glycol, ethanol, trehalose, phosphate-buffered saline (PBS), Dulbecco's PBS, Alsever's solution, Tris-buffered saline (TBS), water, balanced salt solutions (BSS), such as Hank's BSS, Earle's BSS, Grey's BSS, Puck's BSS, Simm's BSS, Tyrode's BSS, and BSS Plus, or a combination thereof.~~

~~174. The composition of 159, wherein a tonicity of the NORS is from about 250 milliosmoles/liter (mOsm/L) to about 350 mOsm/L.~~

~~175. The composition of 159, wherein the NORS comprises a thickener comprising polyacrylic acids, gelatin, pectin, tragacanth, methyl cellulose, hydroxylethylcellulose, hydroxypropylcellulose, HPMC, CMC, alginate, starch, polyvinyl alcohol, polyvinyl pyrrolidone, co-polymers of polyoxyethylene and polyoxypropylene, polyethylene glycol, or a combination thereof.~~

~~176. The composition of 159, wherein the NORS is formulated as a lavage.~~

~~177. The composition of 159, wherein the NORS is formulated as a lavage in an amount of from about 50 mL to about 500 mL.~~

178. The composition of 159, wherein the NORS is formulated as a lavage in an amount of from about 100 mL to about 400 mL.

179. The composition of 159, wherein the NORS is formulated as a lavage in an amount of from about 150 mL to about 350 mL.

180. The composition of 159, wherein the NORS is formulated as a gargle.

181. The composition of 159, wherein the NORS is formulated as a gargle in an amount of from about 5 mL to about 50 mL.

182. The composition of 159, wherein the NORS is formulated as a gargle in an amount of from about 10 mL to about 40 mL.

183. The composition of 159, wherein the NORS is formulated as a gargle in an amount of from about 10 mL to about 30 mL.

184. The composition of 159, wherein the NORS is actuated from a nasal spray bottle.

185. The composition of 159, wherein the NORS is actuated from a nasal spray bottle in an amount of from about 100 µl to about 1000 µl for each actuation of a nasal spray bottle.

186. The composition of 159, wherein the NORS is actuated from a nasal spray bottle in an amount of from about 100 µl to about 1000 µl for each actuation of a nasal spray bottle at a frequency of about 1 to 6 times for each administration.

187. The composition of 159, wherein the NORS is actuated from a nasal spray bottle in an amount of from about 100 µl to about 1000 µl for each actuation of a nasal spray bottle at a frequency of about 1 to 6 times for each administration for a total amount per administration of from about 100 µl to about 5000 µl.

188. The composition of 159, wherein the NORS is actuated from a nasal spray bottle in an amount of from about 100 µl to about 200 µl for each actuation of a nasal spray bottle.

189. The composition of 159, wherein the NORS is actuated from a nasal spray bottle in an amount of from about 100 µl to about 200 µl for each actuation of a nasal spray bottle at a frequency of about 1 to 4 times for each administration.

190. The composition of 159, wherein the NORS is actuated from a nasal spray bottle in an amount of from about 100 µl to about 200 µl for each actuation of a nasal spray bottle at a frequency of about 1 to 4 times for each administration for a total amount per administration of from about 100 µl to about 800 µl.

191. The composition of 159, wherein the NORS is actuated from a nasal spray bottle in an amount of from about 120 µl to about 140 µl for each actuation of a nasal spray bottle.

192. The composition of 159, wherein the NORS is actuated from a nasal spray bottle in an amount of from about 120 µl to about 140 µl for each actuation of a nasal spray bottle at a frequency of about 2 to 4 times for each administration.

193. The composition of 159, wherein the NORS is actuated from a nasal spray bottle in an amount of from about 120 µl to about 140 µl for each actuation of a nasal spray bottle at a frequency of about 2 to 4 times for each administration for a total amount per administration of from about 240 µl to about 560 µl.

194. The composition of 159, wherein the NORS is activated by mixing an acidifying agent with a nitrite solution just prior to administration.

195. The composition of 159, wherein the NORS is activated by mixing an acidifying agent with a nitrite solution.

196. The composition of 159, wherein the NORS is activated by lowering a pH of a nitrite solution just prior to administration.

~~197. The composition of 159, wherein the NORS is activated by lowering a pH of a nitrite solution to the pH of from about 1.0 to about 4.0 just prior to administration.~~

~~198. The composition of 159, wherein the NORS is activated by lowering a pH of a nitrite solution to the pH of from about 3.0 to about 4.0 just prior to administration.~~

~~199. The composition of 159, wherein the NORS is activated by lowering a pH of a nitrite solution to the pH of from about 3.2 to about 4.0 just prior to administration.~~

~~200. The composition of 159, wherein the NORS is activated by lowering a pH of a nitrite solution to the pH of from about 3.4 to about 4.0 just prior to administration.~~

~~201. The composition of 159, wherein the NORS is activated by lowering a pH of a nitrite solution to the pH of from about 3.6 to about 4.0 just prior to administration.~~

~~202. The composition of 159, wherein the NORS releases a concentration of NO of from about 100 ppb and 1000 ppm.~~

~~203. The composition of 159, wherein the NORS releases a concentration of NO of from about 100 ppm and 1000 ppm.~~

~~204. The composition of 159, wherein the NORS releases NO for a period of from about 1 minute and 24 hours.~~

~~205. The composition of 159, wherein the NORS releases NO for a period of at least 1 hour.~~

~~206. The composition of 159, wherein the NORS releases NO for a period of from about 1 minute and 1 hour.~~

~~207. The composition of 159, wherein the NORS has a pH of less than about 4.0.~~

~~208. The composition of 159, wherein the NORS has a pH of between about 3.0 and about 4.0.~~

~~209. The composition of 159, wherein the NORS has a concentration of nitric oxide releasing compound of not greater than 0.5% w/v.~~

~~210. The composition of 159, wherein the NORS has a concentration of nitric oxide releasing compound of from about 0.07% w/v to about 0.5% w/v.~~

~~211. The composition of 159, wherein the NORS has a concentration of acidifying agent of from about 0.07% w/v to about 0.5% w/v.~~

~~212. The composition of 159, wherein the NORS has a concentration of acidifying agent of about 0.2% w/v.~~

~~213. The composition of 159, wherein the NORS has a concentration of acidifying agent of about 0.5% w/v.~~

~~214. The composition of 159, wherein the NORS has a concentration of acidifying agent of not greater than 0.5% w/v.~~

~~215. The composition of 159, wherein the NORS has a pH of from about 3.7 to about 4.0 and wherein the composition has a concentration of nitric oxide releasing compound of about 0.41% to about 0.5% w/v.~~

~~216. The composition of 159, wherein the NORS has a pH of from about 3.6 to about 3.7 and wherein the composition has a concentration of nitric oxide releasing compound of from about 0.07% w/v to about 0.5% w/v.~~

~~217. The composition of 159, wherein the NORS has a pH of from about 3.2 to about 3.6 and wherein the composition has a concentration of nitric oxide releasing compound of not greater than 0.41% w/v.~~

218. The composition of 159, wherein the NORS has a pH of from about 3.0 to about 3.2 and wherein the composition has a concentration of nitric oxide releasing compound of about 0.41% to about 0.5% w/v.

219. The composition of 159, wherein the NORS comprises a nitric oxide releasing compound and an acidifying agent, wherein when the nitric oxide releasing compound and the acidifying agent are mixed at a ratio of about 1:1, the NORS produces an NO concentration of from about 0.7 ppm to about 4 ppm.

220. The composition of 159, wherein the NORS comprises a nitric oxide releasing compound and an acidifying agent, wherein when the nitric oxide releasing compound and the acidifying agent are mixed at a ratio of about 1:1, the NORS produces an area under the curve after 2 minutes of from about from 0.7 ppm*min to about 2.0ppm*min.

221. The composition of 159, wherein the NORS comprises a nitric oxide releasing compound and an acidifying agent, wherein when the nitric oxide releasing compound and the acidifying agent are mixed at a ratio of about 1:1, the NORS produces an NO concentration of from about 1.4 ppm to about 8 ppm.

222. The composition of 159, wherein the NORS comprises a nitric oxide releasing compound and an acidifying agent, wherein when the nitric oxide releasing compound and the acidifying agent are mixed at a ratio of about 1:1, the NORS produces an area under the curve after 2 minutes of from about from 1.4 ppm*min to about 4.0ppm*min.