Infection Control for Instruments

# Table of Relevant Instrumental Pathogens

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## Table of Relevant Instrumental Pathogens (TRIP)

Relevant Instrumental Pathogens (RIPs) are germs likely to get on instruments, gear, and repair tools, and persist long enough to infect others. Similar germs concern workers in healthcare, childcare, foodservice, or education, because these places all serve people, and people move germs. Knowing which germs matter, and how long they last, supports decisions about sanitary cleaning and disinfection, as well as counsel about Personal and Instrumental Hygiene (PIH) and hand hygiene (HH), especially after service and handling by others.

For professionals, an overview of RIPs and their expected viable persistence also supports a sensible and defensible approach to sanitary care, including appropriate cleaning and disinfection. After quarantine, un-dismissed RIPs require active responses based on fomite contact type, frequency, and shared status. Active response options include sanitary cleaning, disinfection, E-PIH-HH, and PPE of players and handlers, and combinations of these. Sanitary cleaning includes all home or professional cleanings with soap or labeled sanitary products. It is only sufficient for unshared parts or for parts that touch only intact skin (NCr or Env). Parts that touch more than hands (NCr) should be disinfected or sanitized when safe to do so. Parts with access to airway, mouth or mucous membranes (SCr) require disinfection between users.

Methods of disinfection are defined by CDC's guide, while chemical disinfectants are registered by the EPA. When gear is not resilient to treatment, un-dismissed RIPs guide the selection of quarantine or other transmission-based precautions (TBPs). These are recipient focused and include E-PIH and PPE barriers through viable persistence of RIPs. E-PIH-HH is common after service or handling by others.

The Table of Relevant Instrumental Pathogens (TRIP) offers a snapshot of 75 RIPs that effectively illustrate the importance of PIH and sanitary cleaning. Bacteria are marked as Gram-positive (Gp) or Gram-negative (Gn), courtesy of Cellinlife [2012]. Lipid enveloped (Le) viruses are indicated [Navaratnarajah et al., 2008], as are Spore (Sp) formers [Hartmann, 2020]. Persistence is adapted from the listed references to support dismissal through quarantine of dry gear that is free from obvious biofilm, bioburden, or thick debris. Quarantine cannot dismiss RIPs that are fed by their substrates (bodies, parts, or cases), or that can be independent or

dormant. The most likely disinfectant category is offered, courtesy of Hartmann's Bode Science Center, but everyone is responsible to follow product directions for each action or level desired.

TRIP data is adapted and presented in good faith. It does not supersede guidance of any governing bodies or IC agencies. Medical advice should come from licensed practitioners, not repairers or other handlers. The TRIP is meant to help clean instruments and accessories wisely, not to treat sick or infected people. It represents only a sampling of RIPs, with preference to those common to the United States. Details about new germs and their viable persistence, and new technology for dealing with them, are always evolving. Every player or professional handler is responsible to verify information for themselves and make their own most sensible decisions about when to use suggested passive quarantines, active response precautions, or both.

ICI supports sanitary experiences for players and safer interactions for handlers. The TRIP is a powerful tool for PH and PIH education advocacy. It helps answer questions about options for specific germs on instruments and guides protocol choices for reprocessing and turnover. It also shows why we might recommend clients use E-PIH-HH for 2-3 months after service or handling by others, especially when C&D cannot be achieved, to keep contagions on instruments out of the face and mouth. Most importantly, the TRIP presents sanitary hygiene as a concern for many germs all the time, not just when a noteworthy pathogen makes headlines.

The TRIP is designed to print with standard settings. Permission to print and share is granted for educational and non-compensable use, *if referenced sources are always preserved.*

# The Table of Relevant Instrumental Pathogens (TRIP)

| Relevant Instrumental Pathogen (RIP) | Microbe Type [Hartmann, 2020] | Viable Persistence Range (rounded up) | Source of Viable Persistence Range | Germicidal, [Hartmann, 2020] |
|---|---|---|---|---|
| Acinetobacter spp. | Gn Bacteria | 2 weeks | Kramer et al., 2006 | Bactericidal |
| vActinomyces spp. | Gp Bacteria | 7 weeks | Gadjacz, 2020 | Bactericidal |
| Adenovirus | Virus | 3 months | Kramer et al., 2006 | Virucidal |
| Aspergillus spp. | Fungus (Sp) | > Years (spores) | CDC, 2020 | Sporicidal |
| Astrovirus | Virus | 3 months | Kramer et al., 2006 | Virucidal |
| Bacillus spp. | Gp Bacteria (Sp) | > Years (spores) | Hartmann, 2020 | Sporicidal |
| Blastocystis spp. | Protozoa | Unknown (cysts) | CDC, 2020 | Parasiticidal |
| Blastomyces spp. | Fungus (Sp) | > Years (spores) | MSDSonline, 1999 | Sporicidal |
| Bordetella pertussis | Gn Bacteria | 5 days | Kramer et al., 2006 | Bactericidal |
| Brucella spp. | Gn Bacteria | 24 hours | Corbel, 2006 | Bactericidal |
| Burkholderia spp. | Gn Bacteria | 7 days | Sham et al., 2007 | Bactericidal |
| Campylobacter jejuni | Gn Bacteria | 6 days, (thrives wet) | Kramer et al., 2006 | Bactericidal |
| Candida spp. (yeast) | Fungus | 4 months | Kramer et al., 2006 | Fungicidal |
| Chlamydia spp. | Gn Bacteria | 15 days | Kramer et al., 2006 | Bactericidal |
| Clostridium difficile (C.DIFF) | Gp Bacteria (Sp) | 5 months (spores) | Kramer et al., 2006 | Sporicidal |
| Coronavirus-02 (SARS-CoV) | Le Virus | 9 days | Kramer et al., 2006 | Virucidal |
| Coronavirus-19 (SARS-CoV2) | Le Virus | Hours to days | CDC, 2020 | Virucidal |
| Coxsackie Virus | Virus | 2 weeks | Kramer et al., 2006 | Virucidal |
| Cryptosporidium spp. | Parasite | 2 hours | Kramer et al., 2006 | Parasiticidal |
| Cytomegalovirus | Le Virus | 8 hours | Kramer et al., 2006 | Virucidal |
| Dientamoeba spp. | Parasite | > Unknown (cysts) | Stark et al., 2016 | Parasiticidal |
| Echovirus | Virus | 7 days | Kramer et al., 2006 | Virucidal |
| Enterobius vermicularis | Parasite | 3 weeks | CDC, 2013 | Parasiticidal |
| Enterococcus spp. (incl. VRE) | Gp Bacteria | Years | Kramer & Assadian, 2014 | Bactericidal |
| Epstein-Barr Virus (incl. HSV4) | Le Virus | < 1 hour | CDC, 2018 | Virucidal |
| Escherichia coli | Gn Bacteria | 16 months | Kramer et al., 2006 | Bactericidal |
| Giardia lamblia | Parasite | Months (eggs) | CDC, 2015 | Parasiticide |
| Haemophilus influenzae | Gn Bacteria | 2 weeks | Kramer et al., 2006 | Bactericidal |
| Helicobacter pylori | Gn Bacteria | 2 hours (thrives wet) | Kramer et al., 2006 | Bactericidal |
| Hepatitis A Virus | Virus | 2 months | Kramer et al., 2006 | Virucidal |
| Hepatitis B Virus | Virus | 1 week | Kramer et al., 2006 | Virucidal |
| Hepatitis C Virus | Virus | 6 weeks | Painstil et al., 2014 | Virucidal |
| Herpes Simplex Virus (1&2) | Le Virus | 2 months | Kramer et al., 2006 | Virucidal |
| Histoplasma spp. | Fungus | > Independent | CDC, 2018 | Sporicidal |
| Human Enterovirus 71 | Virus | 3 days | Cox et al., 2017 | Virucidal |
| Human Immunodeficiency Virus | Le Virus | 7 days | Kramer et al., 2006 | Virucidal |
| Influenza (incl. FLU A, B, H1N1) | Le Virus | 2 days | Kramer et al., 2006 | Virucidal |
| Klebsiella spp. | Gn Bacteria | > Independent | Kramer et al., 2006 | Bactericidal |

# The Table of Relevant Instrumental Pathogens (TRIP) Cont.

| Relevant Instrumental Pathogen (RIP) | Microbe Type [Hartmann, 2020] | Viable Persistence Range (rounded up) | Source of Viable Persistence Range | Germicidal, [Hartmann, 2020] |
|---|---|---|---|---|
| Legionella spp. | Gn Bacteria | < 1 hour | OSHA, 2018 | Bactericidal |
| Micrococcus / Paracoccus spp. | Gp Bacteria | > Years | MSDSonline, 2010 | Bactericidal |
| Microsporum / Trichosporum spp. | Fungus | > Independent | CDC, 2019 | Sporicidal |
| Molluscipox Virus | Le Virus | Unknown | CDC, 2015 | Virucidal |
| Moraxella spp. | Gn Bacteria | 27 days | MSDSonline, 2010 | Bactericidal |
| Mumps virus | Le Virus | < 1 hour | CDC, 2019 | Virucidal |
| Mycobacterium bovis | Bacteria | > 2 months | Kramer et al., 2006 | Bactericidal |
| Mycobacterium tuberculosis | Bacteria | 4 months | Kramer et al., 2006 | Bactericidal |
| Mycoplasma spp. | Bacteria | < 1 hour | MSDSonline, 2010 | Bactericidal |
| Neisseria spp. (incl. gonorrhoeae) | Gn Bacteria | 3 days | Kramer et al., 2006 | Bactericidal |
| Norovirus | Virus | > Weeks | CDC, 2015 | Virucidal |
| Papillomavirus | Virus | > 7 days | Kramer et al., 2006 | Virucidal |
| Papovavirus | Virus | 8 days | Kramer et al., 2006 | Virucidal |
| Parainfluenza spp. | Le Virus | 10 hours | Brady & Evans, 1990 | Virucidal |
| Parvovirus | Virus | > 1 year | Kramer et al., 2006 | Virucidal |
| Poliovirus type 1 | Virus | 8 days | Kramer et al., 2006 | Virucidal |
| Poliovirus type 2 | Virus | 2 months | Kramer et al., 2006 | Virucidal |
| Proteus vulgaris | Gn Bacteria | 2 days | Kramer et al., 2006 | Bactericidal |
| Pseudomonas aeruginosa | Gn Bacteria | > 16 months | Kramer & Assadian, 2014 | Bactericidal |
| Respiratory Syncytial Virus (RSV) | Le Virus | 6 hours | Kramer et al., 2006 | Virucidal |
| Rhinovirus (common cold) | Virus | 7 days | Kramer et al., 2006 | Virucidal |
| Rotavirus | Le Virus | 2 months | Kramer et al., 2006 | Virucidal |
| Rubella | Le Virus | <1 day | MSDSonline, 2010 | Virucidal |
| Salmonella spp. (food poisoning) | Gn Bacteria | 1 day (years biofilm) | Kramer et al., 2006 | Bactericidal |
| *Salmonella typhi, & typherium | Gn Bacteria | 4 weeks, > 4 Years | Kramer et al., 2006 | Bactericidal |
| Serratia marcescens | Gn Bacteria | 5 weeks | Kramer et al., 2006 | Bactericidal |
| Shigella spp. | Gn Bacteria | 5 months | Kramer et al., 2006 | Bactericidal |
| Staphylococcus aureus | Gp Bacteria | 7 months | Kramer et al., 2006 | Bactericidal |
| Streptococcus pneumoniae | Gp Bacteria | 3 weeks | Kramer et al., 2006 | Bactericidal |
| Streptococcus pyogenes | Gp Bacteria | > 6 months | Kramer et al., 2006 | Bactericidal |
| Tinea spp. | Fungus (Sp) | Years (spores) | CDC, 2018 | Sporicidal |
| Torulopsis spp. | Fungus | 5 months | Kramer et al., 2006 | Fungicidal |
| Toxoplasma spp. | Parasite | Years (cysts) | Mirza et al., 2018 | Parasiticidal |

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