The most common microbial hazards that can jeopardize product quality of solid oral dosage forms can often be attributed to contaminated raw materials. Microbial hazards may be introduced into a manufacturing process due to the improper sanitary design of the manufacturing equipment; especially equipment used for aqueous processing steps (i.e., wet granulation or tablet coating). For example, microbial contamination can arise from entrapped water or product residues that remain hidden from procedural cleaning processes due to threaded pipe fittings, non-sanitary valves, piping dead legs, non-sloping pipes, equipment crevices, recessed access ports, bottom discharge valves, and pocket flow meters. Inadequate equipment maintenance may also serve as a potential microbial hazard. For example, misaligned, damaged, or over torqued gaskets between piping connections may harbor a reservoir of trapped microorganisms.

Microbial hazards may also originate from improper facility design. Such hazards could include deficient control of humidity and temperature within the manufacturing area, improper air ventilation systems, or poor room construction design (e.g., porous walls, drop down ceilings, uncovered floor drains).
Inadequate cleaning and sanitization of the equipment and manufacturing areas can potentially serve as a major cause of microbial hazards. Other examples of potential microbial hazards could include the following:

- Cleaned equipment that is not properly dried after cleaning and stored water wet.
- Cleaned equipment that is not properly stored.
- Manufacturing areas that are not adequately or routinely cleaned before use (e.g., standing pools of water, construction materials, cardboard or other debris).
- Cleaning utensils such as mops, buckets, and brushes that are not stored dry or clean.
- For continuous manufacturing with no cleaning between batches, campaign lengths, with consideration of microbial growth, are not established.

Water, a major component in many non-sterile dosage forms, is a potential source of microbial contamination if the incorrect purity standard is utilized during production.

A solid oral dosage form requires the use of at least Purified Water (PW) for production use and as a final rinse during equipment cleaning.[15]

Microbial hazards can arise if key processing conditions employed during the manufacturing of an SOD are not properly established or controlled. For example, if maximum holding times for in-process materials with appreciable water content (e.g., wet granulations, coating suspensions, & binder solutions) are not properly validated, microbial proliferation could readily occur. Other process condition hazards include the improper validation of a microbial reduction step (e.g., pasteurization) or the inability to control excess condensation during blister packaging.

Inappropriately maintained and controlled warehouse and storage areas maybe potential microbial hazards. For example, uncoated tablets are very hygroscopic,

 