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## RO CLEANING/DISINFECTING CONSIDERATIONS

Cleaning frequency is greatly dependent on the amount of operation of the RO system and the quality of feed water supplied to the RO unit.

**Q: How often should RO's be cleaned? (Rule of thumb)**

A1: A central-type RO system should be cleaned at a minimum of every three months. There may be times when the cleaning must be done more often due to changes in the feed water conditions. Sometimes (rarely,) feed water changes can cause fouling in a matter of days, and the RO system must be cleaned once or twice a week to keep pure water production up.

A2: Portable RO units are often used in an intermittent manner, sometimes-heavy usage, sometimes light. Cleaning schedules must be adjusted based on usage, but typically not less than every 4-6 months.

**Q: In what order should the cleaning chemicals be used?**

Over the years due to changes in the chemicals used to clean membranes, the cleaner manufacturers have changed their recommendations as to the cleaner to use first. This has caused confusion. Currently, the recommendation is to use the LOW pH first because if HIGH pH cleaner is used first it can cause some mineral deposits to become irremovable by cleaning chemicals.

A: As a general rule, when performing routine cleaning procedure, always clean with the LOW pH cleaner as the first step, rinse thoroughly, then follow with the HIGH pH clean as the second step.

NOTE: After both steps are completed and the system is thoroughly rinsed, perform the disinfection procedure.

**Q: Why is it that that after cleaning the quality and flow rate is not as good as when the membranes were new?**

A: Cleaning membranes is a chemical dissolving process that removes minerals/organic debris that adhere to the membrane surface. Just like when you wash clothing sometimes you will have a stain after washing. It is the same with membranes. Sometimes you have to wash them several times and you still do not get everything off. Membranes with age will never perform the same as when they were new.

**Q: Will cleaning chemicals damage the RO membranes?**

A: "Normal" exposure (every 2 to 3 months) of the membranes to the different cleaning chemicals should not result in damage to the membranes. An occasional extra cleaning will do no significant harm. However, if a 'fouling feed water supply' problem results in twice-weekly cleanings for an extended period, the membranes may eventually suffer some loss of rejection performance.

NOTE: The necessity for frequent cleaning is possibly an indication of the 'end-of-life' of the membranes, as older membranes tend to require more frequent cleaning.

**Q: Why it is that sometimes after cleaning and disinfecting the membranes fail?**

A: Membranes have been known to fail after a cleaning. The most common reaction is to point to the cleaning solution or a procedural error. Occasionally this is the reason for the damage done to the membranes. A more common reason is that the cleaning uncovered damage that was already on the membrane surface. If you have fouling on your membranes and are using disinfectants having a maximum contact time such as Minncare it is possible to damaged the membranes without any operator knowledge. The foulant can absorb the disinfectant and allow the damage to occur with the longer contact time. Once the foulant is removed by cleaning the damage is exposed and is seen as increased flow rates and or decrease in quality.

**Q: Will disinfecting chemicals damage the RO membranes?**

A1: **Peracetic Acid:** Typically, the 1% peracetic acid used in RO's does not cause any noticeable damage over the normal life of the membranes. "Normal" exposure (monthly) to disinfectant chemicals (mainly peracetic acid, such as Minncare) may result, *over a long period of time*, in loss of rejection performance and increasing permeate flow. Peracetic acid is an oxidizer, and all oxidizers can cause membrane erosion depending on the concentration and the total accumulated hours of exposure.

NOTE: There are some precautions to be followed before the RO system is exposed to peracetic acid. The membranes should be free of iron (clean), 77°F maximum temperature exposure, limit dwell time to a maximum of 12 hours (maximum) and a 1:100 solution.

A2: **Formaldehyde:** With the present status of environmental controls and patient/staff health concerns, formaldehyde is seldom used in dialysis clinics today. However, it is an excellent disinfectant. It can be used without necessity for cleaning the membranes before exposure. Also, there is more flexibility in the temperature, dwell time, and solution concentration (2% or 4% OK).

Formaldehyde is a strong chemical and must be used with appropriate care.

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NOTE: With the first-ever use of formaldehyde, some product flow loss will be experienced, in the range of 15-20%. About half of this loss will be recovered in 24-72 hours, but a portion of the flow loss will be permanent (approx. 8-10%).

**Q: How often should RO's be disinfected?**

A: The true answer is "as often as necessary to maintain biological growth at a low, safe level for the patient." In most clinics, once each month is adequate. However, every municipal water supply is different, and every individual clinic has a different local environment and a different situation than every other clinic. It is impossible to predict how often disinfection will be required. Routine bacterial colony counts and LAL testing will determine the disinfection requirements for a specific clinic and the situation can change over time. Performing a disinfection on the complete water system and not a single component is important in keeping the total system a clean system.