



Cleaning is the Key to Good Disinfection

We are slowly leaving behind an era that concentrated on killing first. In our eagerness to create health care, food preparation, school and home environments that are free of pathogens, we created strong and often dangerous chemical agents that were designed to defeat the enemy immediately upon the first encounter. The only good bug was a dead bug, lying devastated in the disinfectant's path.

The story of the killing era will go down in history along with many other well-intended but ultimately unsuccessful industrial campaigns. The killing era explored all combinations, ending up with the widespread use of disinfectant cleaners that were designed to kill and clean at the same time. Only they really didn't, in most practical applications.

Disinfectants are most effective at creating pathogen-free surfaces when they are applied to pre-cleaned surfaces. They also require that the surfaces remain wet with the disinfectant solution for a minimum contact time, often ten minutes or more. Neither of these conditions is met very often in situations where the disinfectant and cleaner are combined in one solution for daily cleaning. Wipe on, wipe off. Most surfaces air-dry quickly. When is all the killing supposed to take place?

The part that we kept ignoring is the piece about applying disinfectants to pre-cleaned surfaces. Why should that help? *Because cleaning is literally the key to good disinfection.* Pathogens are removed like prisoners of war, and taken off the battlefield immediately so they cannot affect anybody, either live or dead.

The disinfection and cleaning mantras

The logic is only slightly different. In disinfection, the mantra is "if you see a bug, kill it," or even, "if you think a bug might be there, kill everything in sight." In cleaning, the mantra is "if you see soil, remove it," and often "even if you can't see it, remove it anyway."

The corollary to the disinfection mantra is "pour on lots of fire-power; don't let them escape alive." It is ironic that in an era where overkill was the directive, we may not have been achieving much kill at all. And the collateral damage was really quite extensive.

Of course there were many mistakes on the cleaning side as well. We noticed that people didn't really like cleaning. It takes time, and it costs money. So they cleaned as little as they could get away with.

Then the cleaning solution people kept coming up with stronger and stronger cleaners, which were ready to attack the accumulated grunge of the ages that built up

while we weren't cleaning. The corollary to the cleaning mantra became "burn through that dirty stuff, we have no idea where it all came from." And the collateral damage was also quite extensive.

And both the cleaning and disinfectant people also commanded the era of powerful perfumes. The myth that perfumes helped to clean and disinfect became widespread, to the point that users no longer trusted cleaning solutions that didn't convert the room into a lilac bush or a pine forest. The perfume mantra became "only when you can smell what you have done can you be sure that you have cleaned and disinfected." And the collateral damage to people who are made sick by perfumes was quite extensive.

The collateral damage was quite extensive

Both sides had reached the pinnacle of chemical power before they decided to combine forces and attack the enemy together with all they could muster. Neither paid a whole lot of attention to the quiet voices on the sidelines that told them that the people who applied their products were becoming asthmatic, sensitized and disabled.

But while this chemical warfare was in its heyday, many people were indeed suffering ill effects. More and more housekeeping and janitorial staff were experiencing symptoms of sensitization from the continual use of strong chemicals. Skin irritation was becoming more common. Asthma and breathing difficulties were occurring more often. And some people became generally chemically sensitive, and were unable to continue working in their housekeeping and janitorial positions.

The building occupants were often no better off. Every building contains about 15-20% of occupants who are significantly more sensitive than most to various chemical emissions and even to the slightest traces of perfumes. Teachers and students complained of asthma after disinfection sprees that followed viral outbreaks in schools. Parents combined in support groups to advocate on behalf of their hypersensitive and allergic children, some of whom could not even enter a classroom without feeling sick. Sensitive apartment occupants blocked the bottom of their doors with towels and petitioned apathetic superintendents to reduce the perfume levels in the hallways and the garbage chutes. The collateral damage was indeed extensive, and people were getting sick of it.

Why cleaning first works

Why should we clean first? It is just far easier to disinfect a surface if it is already clean. It is very difficult, if not impossible, to disinfect a lump of soil, especially if contains blood or feces. Removing all the big lumps, small particles, sticky deposits, and accumulated layers of dirt and grease *first* goes a long way towards disinfecting an environmental surface. Removal, in effect, is the low-tech version of modern cleaning. But it works, and works well. And now we have come full circle.

Cleaning is highly effective at reducing the soil load, reducing the pathogen load, and reducing chemical residues accumulated on a surface. Once a surface is well-cleaned, there is little about the surface that can reduce the biocidal capacity of disinfecting chemicals, if subsequent disinfection is advised in designated areas. For most surfaces, effective cleaning leaves few enough bacteria that the area has been sanitized sufficiently for most practical purposes. Where additional disinfection is still advisable, appropriate rather than maximum concentrations of potent disinfectants can be used, to further reduce occupational and occupant health risks.

The importance of routine daily cleaning

The second part of the equation is that cleaning itself is easier and more effective if it is done regularly and thoroughly. The enemy, if there is one, is not soil and pathogens, but the buildup of soils and associated pathogens in a form that is hard to remove.

The answer to eliminating buildup is also low-tech. Clean regularly. Clean often. Clean thoroughly. Keep an environmental surface as near to uncontaminated as you can, all the time. This also includes clutter control, as no surface is harder to clean or disinfect than one you can't reach.

For most practical purposes, this means daily cleaning. Sometimes cleaning may be required more frequently, such as when a new patient is moved in, or when there is a mishap that leaves body fluids or feces. But the principle remains the same. Routine cleaning is easier to do, is more effective and requires less chemistry than occasional cleaning. And a surface that is kept clean can be readily disinfected immediately if ever the need arises.

The new era, then, involves separating cleaning and disinfection once again. The former is done regularly, frequently and thoroughly. The latter is used sparingly and with the appropriate power required to do the job, when there is a need to do so.

Minimizing chemistry and cleaning without harming

The final feature of the new era is *cleaning without harming*. Why can't we also reduce the chemistry required to do the daily cleaning? The same principle works in cleaning as for disinfection: a recently pre-cleaned surface is easier to clean than one that hasn't been cleaned in a long time. Routine daily cleaning is easier than occasional cleaning. Routine daily cleaning doesn't require as strong a cleaner as binge cleaning that is done to reduce buildups.

Less buildup means less harmful cleaning ingredients and less perfume. But why should we have to be worried about harmful cleaning ingredients and perfumes anyway? Can't we find ingredients that we not only minimize, but that are themselves harmless? And isn't it about time we admitted that perfumes don't clean?

So the era continues to evolve. The "clean first" era is already giving way to the "cleaning without harming" era, in which we take the same principles to their logical conclusions. If you don't need high-strength cleaning chemicals because you are cleaning regularly, shouldn't we be able to find new, milder ingredients for cleaning that can do what is needed without harming?

In fact, the cleaning industry *is* starting to achieve this vision. Environment Canada's new Environmental Choice^M PRC-097 Criteria establishes what is expected of cleaners that do not harm. PRC-097 has an extensive list of requirements, ranging from the exclusion of ingredients that involve ethylene oxide in their production, to the limiting of volatile ingredients, to the drastic reduction in aquatic toxicity of "Cleaning Products with Low Potential for Environmental Illness and Endocrine Disruption". PRC-097 also acknowledges that chemical hypersensitivity is a major problem and that cleaning products must accommodate the needs of those who are more sensitive than most.

What about SARS and other outbreaks?

The world has responded well to new outbreaks like Severe Acute Respiratory Syndrome (SARS), but to a large extent the old cleaning/disinfecting paradigm is still at work. Emergency disinfection on infrequently cleaned surfaces is not likely to be nearly as effective as effective routine daily cleaning with appropriate disinfection as required in special areas. *Cleaning as the key to good disinfection needs to be part of a longer term, daily strategy, forever.* Short-term binges of cleaning and disinfection inevitably leave us back where we started. We may feel better for having done something, but sooner or later we must question whether we really accomplished what we needed to. And the collateral damage associated with SARS disinfection will no doubt prove to be quite extensive.

The new approach to pathological unknowns is to be prepared. Hospitals are creating negative pressure areas to help contain infection. Extra supplies (masks, gloves and gowns) are being stocked to handle special situations. Airlines and customs officials are learning new ways of screening the travelling public for potential infectious diseases. The public are learning how to wash their hands and take routine precautions when they travel outside their own home. Public health officials are learning how to alert the public and contain an infectious outbreak.

The cleaning and disinfecting equivalent of “be prepared” is to continue to move towards long term routines that handle soil and pathogens effectively everywhere, all the time, while at the same time minimizing everyone’s exposure to hazardous chemicals and minimizing negative impact on the natural environment.

Isn't there a cheaper way?

The irony is that using cleaning as a key to good disinfection *is* the cheaper way. Establishing effective, frequent and regular cleaning routines with minimum chemistry is cheaper than using high-powered super-cleaners. Cleaning first before disinfecting wherever advisable leads to more effective disinfection with less chemistry and less occupational and occupant hazard. And what could be more expensive than making people sick from overuse of irritating and hazardous chemicals?

Sometimes the simplest and most obvious answers turn out to be the best. Often it takes us many years to find that out.