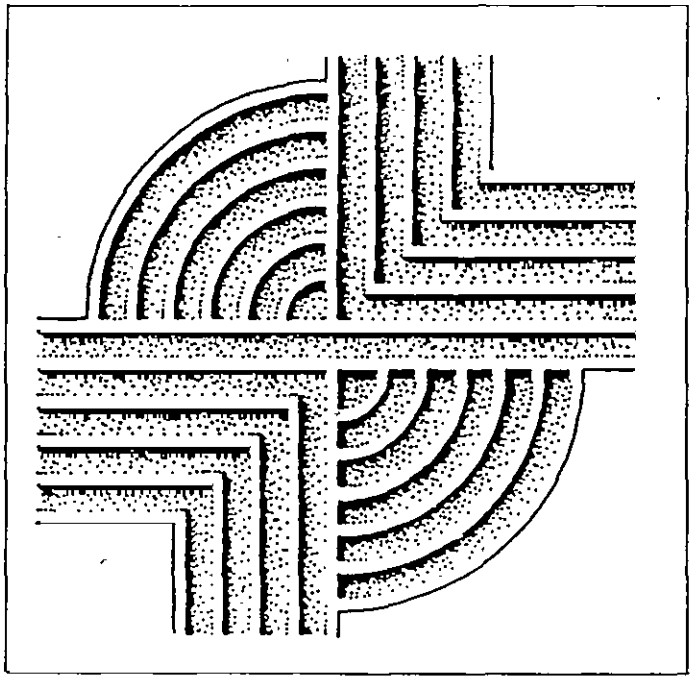
SPLISH SPLASH:
SEWAGE, BLOOD, AND OTHER LIQUIDS



CHICORA RESEARCH CONTRIBUTION 255

SPLISH SPLASH:
SEWAGE, BLOOD, AND OTHER LIQUIDS

Michael Trinkley, Ph.D.

CHICORA RESEARCH CONTRIBUTION 255

Chicora Foundation, Inc.
PO Box 8664 ▪ 861 Arbutus Drive
Columbia, South Carolina 29202
803/787-6910
Email: chicora1@aol.com

September 2, 1998

er presented at the 1998 Annual Meeting, Society of American Archivists, Orlando,
da, in the session, "When Bad Things Happen to Good Archivists,"September 4, 1998

This report is printed on permanent paper ∞

It's a pleasure being here with you this afternoon and I can't think of a better location for such a session than the "Magic Kingdom." I must thank Diana for once again inviting me to participate – and I must even thank her for the wonderful title. I only hope it has conjured up as many visions in your minds as it has in mine.

I know its a truism that we often don't realize the impact we have in many circumstances until far later – and this talk is certainly an example. Little did I realize well over a year ago, when I responded to an inquiry on the Conservation Discussion List concerning books and blood that I would begin to known as the "body fluids" person in archives and libraries. Please note that I have refrained from using the term, "expert," since I am not a physician (or an attorney) and my background is general preservation.

Over the past decade and a half, I have been surprised at what collections can come into contact with – although I am sure that many of you could continue to surprise me with your encounters as well. The original Conservation Discussion List question, as near as I recall, was from a Library where some materials were found with fresh semen, as well as some others with still moist blood – and the question was, "how do we clean them."

I can't remember exactly what my first reaction was, although I suspect on "yuck scale," it was somewhere around 8.5. I frankly can't imagine cleaning as a first choice, but certainly there are some materials that are so valuable, or so difficult to replace, that discard is not an option.

My focus at that time wasn't so much on cleaning techniques as it was on personal protection – and when we talk about body fluids that generally means compliance with OSHA's "Occupational Exposure to Bloodborne Pathogen Standard." The purpose of the standard was to eliminate, or minimize, occupational exposure to Hepatitis B (HBV), Human Immunodeficiency Virus (HIV), and other bloodborne diseases.

The standard generally applies to any business or industry where even a single employee has "occupational exposure." Your first inclination is probably to think that archivists don't have an especially high "occupational exposure." After all, dealing with body fluids isn't in the job description. Typically we think of health care professionals – doctors, nurses, EMTs, and so forth – as having "occupational exposure" to blood and other disease agents. Yet this is one of those cases where your first inclination may be wrong. "Occupational exposure," means any employee whose job activities bring them into contact with blood or other potentially infectious body fluids. Consequently, if you

have a first aid kit and dispense band-aids, or if you are going to render first aid in an emergency, or if you are going to deal with contaminated records, you are likely to have "occupational exposure" as defined by OSHA.

Remember, too, that even if you are saying to yourself, I'd never deal with books or papers that have fresh blood on them, Hepatitis A is known to live in dried blood for at least seven days. So the truth of the matter is that you may have exposure to which you really aren't aware.

The employer has some requirements under the Standard, including producing a written exposure control plan, providing protective equipment, developing a written housekeeping schedule, providing Hepatitis B vaccine, providing post-exposure evaluation and follow-up, training, and record keeping. Sounds imposing, but the truth is for those of us outside the mainstream of blood and gore, it's really not too complex. And as with all OSHA Standards the employee has equal responsibilities, including complying with the rules and wearing appropriate protective equipment.

Most of the training really does boil down to what your mother tried to teach you — don't touch strange things — and blood and other bodily fluids typically count as "strange things." And frankly, you can provide training for this Standard within a typical Monday morning staff meeting, so the burden isn't terribly great. It's likely that your institution is already providing training to housekeeping staff, so the training can be easily extended to your department or section.

It's also comforting to realize that the skin is an excellent barrier, but often that barrier is breached by cuts, scratches, scrapes, rashes, burns, blisters, or even acne. And there is too often hand to mouth contact, through eating, smoking, or doing any number of things that our mothers told us not to do.

While we're not going to go through the entire training program, I do want to briefly mention that of all the things that blood carries, hepatitis is without doubt one of the most serious. In fact, many health care workers are more concerned with hepatitis than with AIDS. Hepatitis is an inflammation of the liver. Although often caused by alcohol or drugs, it can also be caused by viral infections, the most common being type A and type B.

Hepatitis A, also known as infectious hepatitis, is transmitted by products soiled by fecal material. It can be directly transmitted person to person, or more anonymously by contaminated water or shellfish. There are around 200,000 reported cases a year, but only about 100 deaths. However, about a third of the American public has been exposed at one time or another and has acquired immunity. Although Hepatitis A vaccine is highly effective, and immune globulin can be administered pre- and post-exposure, the best prevention is good hygiene and sanitary practices.

Hepatitis B, also known as serum hepatitis, is transmitted by sexual contact and more importantly, for our purposes, via blood to blood or contact. Type B may also found in other bodily fluids, including saliva. There are upwards of 320,000 infections a year with around 6,000 attributable deaths, largely from chronic liver disease including primary liver cancer. The CDC estimates that there are 1.25 million chronically infected Americans. A Canadian study found over a third of medical lab technicians tested positive for Hepatitis B and that the risk of HBV infection was far greater than the risk of HIV infection, a conclusion confirmed by the CDC. There is a Hepatitis B vaccine, although again the best prevention is avoiding or modifying high-risk activities and practicing safe handling of potentially contaminated materials.

HIV/AIDS is contracted in many of the same ways, the primary being through exposure to infected blood, semen, and vaginal secretions. Prevention is likewise similar, relying on what are called universal precautions and modifying or avoiding high risk behavior. While I don't intend to belittle the impact of HIV/AIDS, the virus itself is very fragile and unlike hepatitis, can survive outside the host for only a very short period of time — typically a few minutes to a few hours.

With this information in mind, what then is the appropriate response to books or papers evidencing body fluids?

Presumably the answer is to some degree directed by the quantity — there being considerable difference between a few drops and a sodden mass. While cleaning is an option with one, discard might be a better option for the other. Nevertheless, even discard poses some problems. Those red biohazard bags typically can't be taken out to your dumpster and tossed in. Regulation of infectious waste, however, is on a state-by-state basis. In South Carolina, for example, an item isn't considered regulated infectious waste unless it is super-saturated with blood or bodily fluids — that is, it is dripping liquid.

Cleaning, as you might imagine, is somewhat problematical and it is important to distinguish, at some level, between cleaning and conservation treatment. It may be possible to remove the body fluids from bindings or headcaps, but more difficult to remove the staining or dealing with text that is blocked together. My discussions will be limited to cleaning — with occasional comments on how this cleaning might affect the item. I should also point out that in the health care field "cleaning" is typically taken to mean the physical removal of blood, tissue, and other organic matter, prior to disinfection or sterilization, with the understanding that disinfection in particular, is often ineffective without removal of the gross (no pun intended) residues.

Sterilization destroys all forms of microbial life, including very high numbers of bacterial spores, typically using pressurized steam, ethylene oxide, or immersion in some EPA-approved sterilant for multiple hours. None of these, of course, are appropriate for archival or library collections. Nor do we really need to sterilize papers because they

have body fluids on them.

Next in line is disinfection, which itself is divided into high-level, intermediate-level, and low-level techniques, the difference being the quantities and types of materials killed. For example, low-level disinfection destroys most bacteria, some viruses, some fungi, but not tuberculosis or bacterial spores. Mid-level disinfectants may be proprietary products with EPA registrations or a 1:100 dilution of common household bleach.

At the low end of the cleaning methods is "environmental disinfection," which is little more than wiping surfaces with cleaners or disinfectants — routine maintenance, if you will.

For our purposes we're probably looking at low to intermediate-level disinfection, which means using bleach, alcohol, or a variety of proprietary products to remove the body fluids from books, bindings, and papers. Bleach, even if it had no effect on the archival material, seems a poor choice since the carrier is water, resulting in potential water spotting, running of inks, and even increased mold activity as the paper stays damp. Perhaps more suitable are alcohols, which have excellent bactericidal properties and are effective against hepatitis B and HIV. However, the downside is that for alcohol to be effective, the object must be thoroughly wetted — a quick wipe is ineffective. Whether a specific document, set of papers, or binding can withstand that degree of treatment, of course, must be item-specific.

I must also caution you that allowing the body fluids to dry and "scraping" them off poses some degree of hazard as well. The CDC, for example, warns:

> Airborne particles of dried blood may be generated when a stain is scraped. It is recommended that protective masks and eyewear or face shields be worn by laboratory or evidence technicians when removing the blood stain for laboratory analysis ("Guidelines for Preventing Transmission of Human Immunodeficiency Virus and Hepatitis B Virus to Health-Care and Public-Safety Workers," *MMWR*, vol. 38, no. S-6).

With all this said, it is clear that treatment of soiled books, papers, and documents is problematical and boils down to our ability to replace an item. If the material can be replaced, even by a photocopy, it may be more appropriate to discard the original rather than to attempt cleaning. However, if cleaning is undertaken, appropriate protective equipment is necessary. Under most circumstances this involves minimally gloves. Nitrile gloves are often a good choice, providing better tear and puncture resistance than either vinyl or latex. In addition, nitrile gloves avoid the increasing problems associated with latex sensitivity and allergies. At times a mask might be appropriate, especially if the material is partially dried and being manually scraped off. And when a mask complying with OSHA's Bloodborne Pathogen Standard becomes a respirator, falling under OSHA's Respiratory Protection Plan requirements, it becomes the subject of yet another

fun and fact-filled presentation. The point is, cleaning safely isn't nearly as easy as it used to be.

Moving on to the issue of floods, the old warning that "water is never ***just*** water, was never more true than today. Flood waters tend to transport a whole host of contaminants — fertilizers, pesticides, heavy metals, and, of course, sewage and other wastes. This came home to an institution in Charleston, SC after Hurricane Hugo. Returning to their building, the staff was initially delighted to see intact walls, windows, and roof. Their faces fell, and noses twitched, when they opened the front doors and discovered that the absence of a backflow preventer valve resulted in a basement filled with floating collections and other people's sewage.

While we would all probably like the ability to close the doors, go home, and call an outside recovery firm for such massive problems, that isn't always possible when the toilets down the hall are overwhelmed. Moreover, floods have been in the news recently — Texas, North Carolina, Louisiana — all have within the past few months had to cope with an abundance of a good thing.

Remember, water is never just water. In addition to all the things you can imagine that it contains, it also is the carrier for hepatitis A, cholera, typhoid fever, *E. coli*, Norwalk virus agents, such infections as tularemia, and a whole range of parasitic protozoa, such as *Giardia lamblia* and *Entamoeba histolytica* cysts.

Remember that Hepatitis A, which I spoke about a few minutes ago, can be transmitted through sewage contaminated water. Cholera, an acute diarrheal illness, is caused by a bacterium. It can be spread into water contaminated by the feces of an infected person. Periodically cholera will occur as a result of people eating contaminated seafood, usually shellfish. Often the source of the contamination cannot be identified. This was the case in 1991 when Mobile, Alabama shellfish were found contaminated and also in 1986 when cholera was isolated from sewage samples in a number of Louisiana parishes.

There are only about 400 cases of typhoid fever a year and 70% of these are contracted overseas — so it isn't typically a major health concern. Nevertheless, it, too, is passes via fecal material into water systems. The Norwalk virus is one of my favorites — second in prevalence only to the common cold, it causes at least 40% of all nonbacterial diarrhea. Similarly *E. coli* has been in the news quite a bit and probably everyone — especially if they have read Robin Cook's *Toxin* — are familiar with the causes and effects. Both can be spread via water or food by the fecal-oral route, and possibly by the respiratory route as well.

Tularemia, also known as Rabbit Fever, is one of those unusual diseases that isn't normally associated with flood water. Yet, we know that flood waters — contaminated

with the feces of infected rodents, mammals, or birds or in the feces of ticks on the animals — can carry the causative agent.

Finally, there are the protozoa that produce illness such as giardiasis. In the United States about 7% of all stools submitted for analysis will contain *G. lamblia* cysts. The protozoa, while often associated with poor sanitation in foreign countries, is also found in chlorinated, but poorly filtered, community water systems. Amebiasis is caused by *E. histolytica*, whose cyst is very resistive and easily spread by contaminated water and poor sanitation. Its occurrence in the US is sporadic and the infection rate is less than 1%. Even roundworms, another parasite, may be transmitted by fecal material spread by flooding.

The point is, again, that water is never ***just*** water. There is a potential for waterborne disease transmission.

On the other hand, CDC studies of flood and earthquake disasters reveal that communicable disease outbreaks rarely result — no matter how much sewage is splish slashing around. Unpleasant, perhaps; smelly, certainly; but, a serious health hazard, usually not.

Dealing with flood recovery of documents — whenever the water is something other than a very obvious potable water source — does require some additional protective clothing. The two most important pieces of equipment are boots and gloves.

Boots should be watertight (those leaky waders you've been hanging onto won't do), and should have both a steel toe and a steel insole — not just a steel shank. The steel toe is primarily protection against dropping something, while the steel insole is designed to offer protection against punctures, which could inject contaminates deep under the skin. That is also why the boots should have more than just a steel shank, which is largely designed for comfort, not protection. Beta makes such boots, in the $32 to $65 range and typically firefighter bunker boots are also appropriate, although they are far more costly. The point is that appropriate boots are not disposable items — they will be costly, but essential items of equipment if you plan on flood recovery.

Gloves offer protection in reverse proportion of their dexterity. While 4-mil nitrile gloves are good for blood and body fluids, groping around in sewage and mud calls for a more durable — and longer sleeved — glove. Nitrile or natural rubber 18-inch gloves are perhaps the shortest acceptable length — after all, they reach only to the elbow. Shoulder length neoprene gloves might provide considerably more comfort, but they are also about $50 a pair. Staff must also be trained on how to remove contaminated gloves — it doesn't do much good to wear gloves if you then contaminate yourself getting them off.

Regardless of how well protected you are, there are still some very simple hygiene steps or precautions that everyone dealing with flood waters should understand. The most simple is that you should always wash your hands:

- between gloves changes,
- at the end of the work shift,
- before and after toilet use,
- before taking a smoke break, and
- before preparing or eating foods.

Moreover, you should wash with either potable water or water which has been brought to a rolling boil for at least a minute, then allowed to cool.

Simple, quick (5 to 15 seconds) handwashing with soap will eliminate most of the transient microorganisms. Therefore, under normal conditions a vigorous, 10 to 15 second rubbing together of all surfaces of lathered hands, followed by rinsing under a steam of water is usually sufficient. If hands are visibility soiled or there is the suspicion of contamination, more time and effort is warranted. I emphasize this since most of us are rather lackadaisical in our hand washing. While regular washing is typically effective, one study found that if microorganisms were rubbed into the skin (such as might happen under a broken glove where work continued and there was abrasion), regular washing would not reduce the bacterial levels. Yet another study has shown that frequent, but not very effective, washing, may actually increase the bacterial levels.

Appropriate washing involves friction and it includes all hand surfaces. This later issue is particularly important since parts of the thumbs, backs of the finger, backs of the hands, and beneath the fingernails are almost never washed without an effort to do so.

If bar soap is used, it should be placed on a rack, allowing it to drain. Water soaked soap will actually breed bacteria. Likewise, liquid soap dispensers should be (although they rarely are) washed between refills, since they, too, can become contaminated and serve as reservoirs of microorganisms. It is also important to understand that the major action of bar soap is the mechanical removal or shedding of microorganism — not killing or inhibiting.

More effective are various hand antiseptics — either soap with an antiseptic additive or alcohol-based products. Again, all of the hand surfaces must be covered.

Alcohol based products are very effective and, in fact; a 1-minute scrub using an

alcohol product is as effective as a 4 to 7-minute scrub with other antiseptics. A sufficient quantity must be used to thoroughly wet or drench the hands. Brief skin wipes are almost totally ineffective. The type of alcohol is much less important than its concentration, with 60% to 90% being most effective. Generally 70% is the maximum used to reduce skin drying — which of course is the major disadvantage.

Another common product today is triclosan, a diphenyl ether. Although a poor fungicide, it has good, broad spectrum activity against other microorganisms. It offers far more persistent activity than alcohol and its activity is only minimally affected by organic matter. Typically the maximum concentration used is about 1%. It is absorbed through intact skin, although it is thought to be nonallergenic and nonmutagenic, at least with short-term use.

Once washed, drying your hands on that rag hanging at the end of sink pretty well defeats the whole goal. Studies are inconclusive, but it appears that paper towel drying is not only quicker, but just as effective as warm air driers (which most likely won't be operating during a flood anyway).

As one last caution, individuals with suppressed immunity, including those who have organ transplants, are undergoing chemotherapy, or are HIV positive, should be especially aware of these issues.

While I am hardly encouraging a "why worry, be happy" attitude, and I think institutions should be prepared — both mentally and physically — to deal with biological contaminants, I also believe that common sense and good hygiene are likely to adequate under most circumstances. There is considerable wisdom in the mother's admonishment, "don't touch that, its nasty."