

Unit IV:

Practice Settings

INTRODUCTION

As of 2014, 2.8 million Registered Nurses were actively working in the United States, with 61% employed in hospitals (Bureau of Labor Statistics, 2015). Many work in other clinical settings, such as community health, clinics or public health departments. Whether nurses practice in clinical care specialties, education, research, or advocacy, all nurses are to practice in an environmentally safe and healthy manner.

Our professional *Scope and Standards of Practice* (ANA, 2015) outlines what nurses are obligated to address. Standard 17 states that “The registered nurse practices in an environmentally safe and healthy manner” (p. 84). This particular professional obligation reminds us that as nurses we need to address both upstream and downstream impacts when considering environmentally safe and healthy practice. First, we want to look upstream to address environmental determinants of health or illness, in our assessment, care planning, education and evaluation. Second, we want to decrease downstream environmental impacts of our own practice--the pollution we add to the world because of our professional choices. No matter where we practice--hospitals, clinics, universities, agencies, or communities--we can choose processes, practices and products that are less environmentally harmful. And nurses everywhere need to be alert to our occupational hazards.

Unit IV introduces nurse exposures to hazardous materials in hospital practice settings, pharmaceutical waste disposal, and “green teams” that address environmental health and sustainability in hospitals. Last, is a list of who’s in charge of various aspects of the hospital environment.

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NURSE EXPOSURE IN WORK

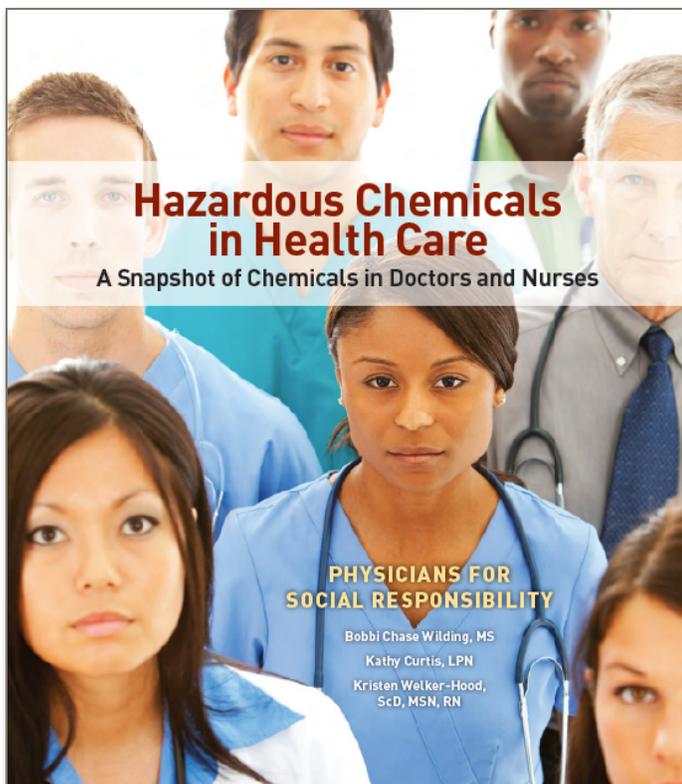
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Over 60% of nurses in the US work in a hospital setting. While our mission in hospitals is to provide healing environments, the methods of healing often result in chemical, biological, and radiological exposures to the patients and hospital employees. This section will review some of the potential exposures that nurses experience and ways in which nurses are engaging in environmental health changes that are not just decreasing exposures but actually promoting health.

In the past few years, there have been a couple of studies that have helped us to understand the importance of addressing our own workplace environments.

The [Nurses' Exposure Study](#) showed us that there are a number of increased risks for disease (asthma, infertility, cancer, and others) that may be associated with chemical and radiological exposures in hospitals.



The [Nurse and Physician Body Burden Studies](#) found measurable amounts of toxic chemicals that are commonly found in hospitals, in the blood and urine of doctors and nurses.

In a 2011 study, using the National Health Study II, Lawson et al found an increased risk of miscarriage in nurses who

were exposed to chemotherapeutic agents, sterilants, or X-Rays. Read the [abstract here](#).

These studies help us to understand that the chemicals and processes that we use in health care create clear and present risks to our health.

WORKING THE GREEN SHIFT

Occupational and environmental health has not received much attention in nursing curriculum and therefore nurses have lacked the skills to both assess occupational/environmental risks and to reduce or eliminate them. In the last decade or more, some nurses from around the country have begun to look at their hospitals through a new occupational and environmental lens. They have seen unnecessary exposures to toxic cleaning products, batteries that are being tossed in the trash, and product-selection based on lowest cost with little attention paid to potentially harmful exposures to patients and employees. They noted that hospital waste was not segregated, not recycled (nor composted) – practices that they did at home. And they started to question these old practices and bring new and sustainable practices to their hospitals – occupationally and environmentally healthy practices.

This section of the text will guide the reader through a range of issues associated with environmental health and sustainability in health care. It will also help the reader to understand how positive changes are being made – how Green Teams are being created, new collaborators are being found in Housekeeping and Dietary Services, and how changes in purchasing decisions can have a huge impact on health.

(Note: it will not cover needle stick injuries, lifting policies, workplace violence, nor bloodborne pathogen exposures – all of which are critical occupational health issues in nursing. For more information on these issues, we refer you to the [American Nurses Association's Center for Occupational and Environmental Health site](#)).

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HAZARDOUS EXPOSURES IN HEALTHCARE

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While hospitals and other healthcare facilities are meant to be places of healing, many of the chemicals and products used in healthcare can have negative impacts on the health of patients, visitors, nurses, and staff.

MERCURY

Most hospitals have replaced their mercury thermometers with digital, mercury-free ones. This process occurred because nurses and others discovered the dangers posed by mercury. A conscious effort was made to substitute and healthier choice for one that posed a hazard. Mercury-containing products are particularly problematic if they are incinerated. When the mercury that is released into the air from incinerator emissions lands on bodies of water a set of processes occur that result in mercury-contaminated fish. Below is an illustration of the “fate and transport” of mercury (Figure 1).

Mercury is a powerful neurotoxicant, linked to health effects in humans and animals. Long-term exposure to mercury can cause effects which develop gradually. It may cause shaking of the hands, eyelids, lips, tongue, or jaw. It may cause headaches, trouble sleeping, personality change, memory loss, irritability, indecisiveness and loss of intelligence. It can also cause skin rash, sores in the mouth, or sore and swollen gums. Many of these symptoms go away when the exposure to mercury stops. Mercury is excreted in urine.

KEY RESOURCES

- [EWG's Fish List page](#) on website of Environmental Working Group lists mercury levels in fish and other seafood
- [Global Movement for Mercury-Free Health Care Report \(pdf\)](#)
- [Making Medicine Mercury Free \(pdf\)](#)
- [The Mercury Problem: Fast Facts \(pdf\)](#)
- [Mercury-Free Health Care website, a WHO-HCWH Global Initiative](#)
- [Mercury Policy Project website](#)
- [Mercury Thermometers and Your Family's Health \(pdf\)](#)
- [Toward the Tipping Point \(pdf\)](#) WHO-HCWH Global Initiative to Substitute Mercury-Based Medical Devices in Health Care and Two-Year Progress Report

MERCURY ON THE MOVE: RISKS TO YOU AND YOUR FAMILY

A poster explaining the methylmercury exposure pathway, which answers the question: How does mercury travel from the health care setting to the dinner plate? Please download, print, and distribute this poster. Download: [Mercury Poster](#)

Tabletop Display

Using the mercury pathway poster and materials found here, you can design your own freestanding educational display that can be used to educate audiences on the hazards associated with mercury. The components of the display include the mercury pathway poster as a focal point and a selection of supporting materials to choose from. Download: [Mercury Display](#)

PLASTICS

We use a lot of plastics in health care – IV tubing and bags, respiratory therapy tubing, dialysis tubes, etc. There are two major problems with plastics. First, is the problem with polyvinyl chloride which is the component chemical in polyvinyl chloride (PVC) plastics. This particular plastic is toxic during its manufacture when both workers and the environment can be exposed to dioxins (a family of highly toxic chemicals) whose unintentional exposures are the consequence of PVC manufacture. Dioxin contamination also results when PVC products are incinerated, either in medical waste incinerators or municipal incinerators. It's important for nurses to know how and where the waste from their hospital is disposed. When PVC waste products are sent to landfills, there is no real concern regarding exposures. However, if PVC waste is sent to an incinerator, very unhealthy air contaminants can result. Dioxins are some of the most carcinogenic chemicals known.

Hard plastics are made more malleable (for use in IV bags, tubes and so on) by the addition of phthalates. Phthalates are a group of chemicals that come with a range of health effects, including endocrine disruption. The particular phthalate that is commonly found in hospital equipment is Diethylhexyl Phthalate (DEHP). Studies indicate that there is a risk of testicular problems in baby boys who are exposed to DEHP and it is further recommended that DEHP-free tubing be used in neonatal intensive care units.

Some hospitals have made the shift to DEHP-free NICUs and others are even DEHP-free throughout the hospitals. DEHP-free products are now readily available and price competitive.

Health Care Without Harm has created a set of resources on Plastics and DEHP.

KEY RESOURCES

- [Alternatives to PVC and DEHP](#)
- [Aggregate Exposures to Phthalates in Humans: HCWH 2002 Report](#) (pdf)
- [DEHP Exposures During the Medical Care of Infants](#) (pdf)
- Find out more about [PVC-Free Building Materials](#) (pdf)
- [Neonatal Exposure to DEHP and Opportunities for Prevention](#) (pdf)
- [Weight of the Evidence on DEHP](#) (pdf)
- [Why Health Care is Moving Away from PVC](#) (pdf)

GREEN CLEANING IN HOSPITALS

Hospitals have to have high standards for cleaning and disinfecting. However, they can select products that are both effective AND green, as a way of decreasing exposures to patients, staff and visitors. Green cleaning refers to using cleaning products that do not contain toxic chemicals (including fragrances), some of which are

associated with respiratory and other health problems. Some hospitals are also addressing the paper and equipment used in cleaning processes, requiring paper products used for cleaning to contain recycled material and requiring the use of microfiber mops, which decrease water consumption.

In other hospitals, green cleaning policies have gone so far as to include specifications for cleaning versus disinfecting. It is important to understand the difference between cleaning and disinfecting. Disinfectants pose the highest risk, as they are formulated to kill bacteria. New, safer disinfectants are coming to market in the United States that are hydrogen peroxide based. Because these disinfectants break down into hydrogen and water, there is essentially no risk of adverse health effects. Some of the hydrogen peroxide based cleaners also boast a shorter contact time that contributes to better infection prevention (Perez et al 2005).

When disinfectants or sterilants are warranted, such as cleaning a NICU warmer or incubator in-between patients, or cleaning equipment in the cath lab operating room, it is critical for nurses and others to know how to protect themselves when using the products. Reading the safety data sheet (formerly MSDS), the chemical information sheet associated with the product, can be

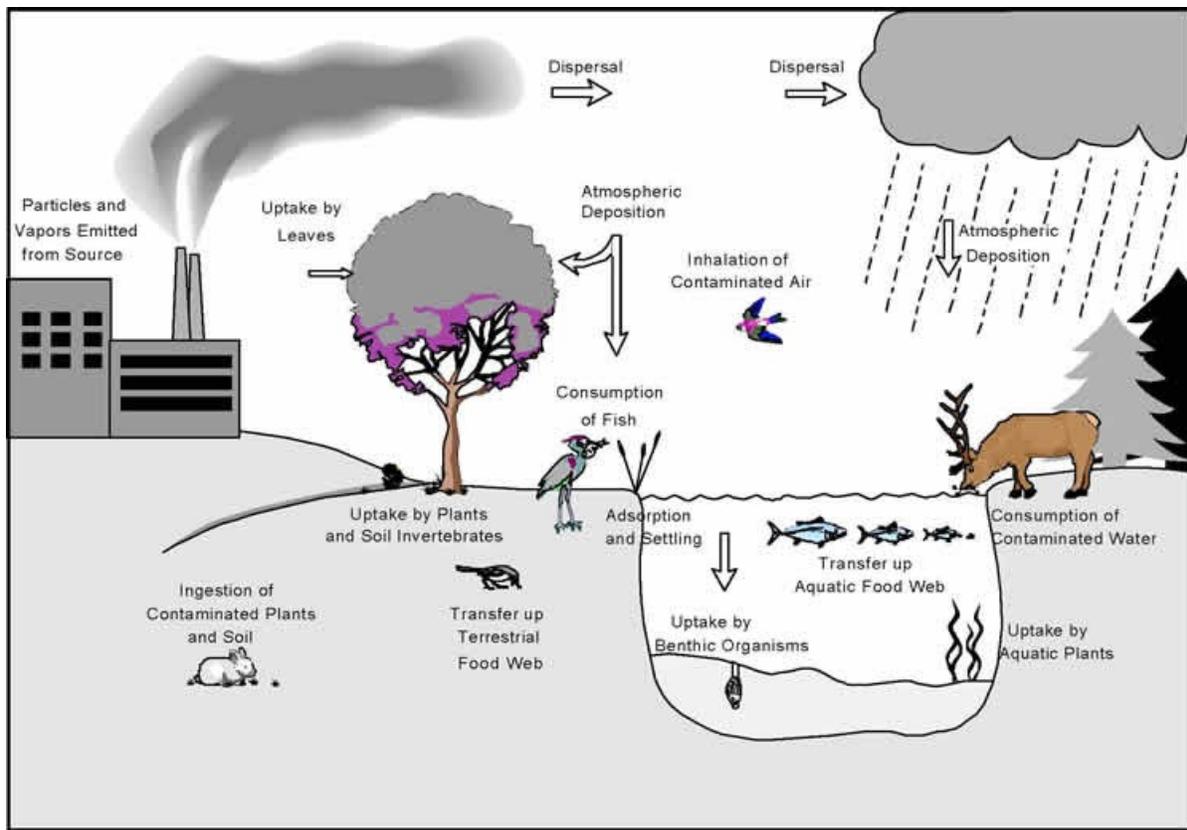


Figure 1: <https://www.epa.gov/fera/multimedia-fate-and-transport-modeling-general>

helpful but sometimes it is too vague. The statement “wear gloves” or “use respiratory protection when using this product” is not sufficient guidance. If that is all that is suggested on the safety data sheet, then the manufacturer needs to be called and queried about the precise type glove and/or respirator (mask).

Some manufacturers provide substantial guidance and it is then incumbent on nurses and others to make sure they are following the manufacturer’s recommendations. For example, on a safety data sheet for gluteraldehyde, the manufacture has this to say about skin protection:

“To protect hands and forearm wear gloves of appropriate type and length. MICRO TOUCH latex gloves are acceptable, if changed frequently (i.e. every 5 – 10 minutes) and/or double gloved. Before using other latex gloves contact the manufacturer for permeation information to determine if their gloves are suitable for use with gluteraldehyde solutions. Nitrile rubber, butyl rubber, and similar synthetic rubber gloves (i.e., ALLERGARD Synthetic Surgical Gloves, are acceptable glove materials. Do not use neoprene rubber, or polyvinyl chloride (vinyl) gloves, as gluteraldehyde may rapidly absorb by these materials.”

If sterilants and disinfectants are potentially hazardous to adults then we can assume that the very susceptible neonate will be considerably more responsive. For neonates that are not on independent respiratory support it is important to consider their potential exposures to cleaning chemicals, antimicrobial soaps, and disinfectants. Many hospitals use flooring materials that require extensive maintenance by stripping, waxing, etc and many of these products have been linked to respiratory problems (Rosenman et al 2003, Medina-Ramon et al 2005). In addition to looking for safer cleaning chemicals, it is important to also consider changing the surfaces to make them easier to clean. For example, the University of Maryland Medical Center is transitioning to rubber flooring, which does not require the use of wax, and hence, floor strippers. The companies producing these no-wax products are boasting less slips, trips and falls because the floor is less slippery.

Many health care facilities are adopting “fragrance free” policies and these policies can extend to cleaning products. Educating housekeeping staff and others in the hospital about the true smell of clean – which is NO smell – will help them to rethink the need for pine or lemon-smelling products. Real pine and/or lemons are rarely part of the fragrances’ ingredients.

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PHARMACEUTICAL WASTE

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Nursing practice is closely connected to the use of pharmaceuticals, both in inpatient and community settings. Many nurses recall when the common practice was to flush out-of-date or unused medications down the toilet to prevent accidental poisonings or misuse. Due to studies that show the presence of pharmaceuticals in drinking water, there has been increased regulatory oversight and scrutiny of medication disposal. Pharmaceutical waste has serious implications for the environment. Additionally, there are operational and financial concerns posed by regulatory agencies. Such federal agencies include the Department of Justice Drug Enforcement Administration (DEA), Environmental Protection Agency (EPA), Centers for Medicare and Medicaid Services (CMS), and U.S. Food and Drug Administration (FDA) (Knutsen, 2013).

PHARMACEUTICAL CONTAMINATION OF THE ENVIRONMENT

The work of the United States Geological Survey (USGS) indicates categories and amounts of pharmaceuticals that find their way to waterways. A USGS study in 2002 found that “one or more chemicals were detected in 80 percent of the streams sampled, and 82 of the 95 chemicals [tested for] were detected at least once. Generally, these chemicals were found at very low concentrations (in most cases, less than 1 part per billion). Mixtures of the chemicals were common; 75 percent of the streams had more than one, 50 percent had 7 or more, and 34 percent had 10 or more” (USGS, 2002). Since that time, the USGS has conducted more studies to better understand the scope and degree to which pharmaceuticals are present in water. Their work on [Emerging Contaminants in Environment](#) provides evidence of this growing concern for health. Further, soil can be contaminated with pharmaceuticals through the use of reclaimed water. The [USGS studies of pharmaceuticals in soil](#) indicate how ubiquitous pharmaceutical waste is in the environment.

Pharmaceuticals enter the environment in several ways. First, human consumption of medications leads to excretion of chemicals into sewage that can release into aquifers or surface water. While this is unintentional contamination, there is also the purposeful flushing of unused or expired medications. Contamination also occurs as part of pharmaceutical manufacture and waste disposal. There is also the excretion of pharmaceuticals by animal sources, due to use of medications (generally

steroids and antibiotics) in livestock production (Becker, Mendez-Quigley & Phillips, 2010).

Due to the aging of the population and increase in prescription medication use, there is an increase in the likelihood of pharmaceutical waste in the environment. It is estimated that hospitals and long term care facilities contribute up to 65% of the unused pharmaceuticals into wastewater facilities (Becker, Mendez-Quigley & Phillips, 2010). The article [Managing Pharmaceutical Waste: What Pharmacists Should Know](#) is very helpful to understand the following: what pharmaceutical waste is, who is generating it, common waste streams, characterization of hazardous waste streams, and how it should be managed.

SAFE MEDICATION DISPOSAL EFFORTS

Some efforts to safely dispose of medications are proactive and work at the source of pharmaceutical use. Two organizations, Practice Greenhealth and the American Nurses Association (ANA), promote safe medication disposal efforts.

[Practice Greenhealth](#) is an organization for the health care community dedicated to environmental stewardship, and sustainable and eco-friendly practices. Through their work and outreach to health care institutions, they provide [guidance and educational resources for pharmaceutical waste management](#).

The ANA promotes the safe disposal of pharmaceuticals and offers guidance on the [Nursing World website](#). ANA adopted a policy to describe nurses’ role in pharmaceutical waste generation and disposal (Stanton, 2011). The types of medications found in waterways include medical waste, hazardous waste, and controlled substances. Among these are antibacterials, antibiotics, endocrine disruptors, plasticizers, steroids and other metabolites. Nurses are leaders in this effort in many locations. Nurses must address pharmaceutical waste in their practice because they administer and dispose of medications. Also, nurses must educate and supervise others in the proper use and disposal in the community. Nurses can serve an advocacy role in policy formation for the development, production and distribution of medications as well as health care policies for safe disposal. In addition, nurses can work with organizations such as Health Care without Harm to address this problem.

The [Association of periOperative Registered Nurses \(AORN\)](#) has demonstrated leadership in the area and published useful information in the AORN journal. For example, the Summary of Recommended Pharmaceutical Waste Streams identifies the variety of proper disposal strategies (Stanton, 2011).

Many hospitals and health care agencies promote [Take Back Programs](#) that are sponsored by the DEA. These programs are designed for members of the public to dispose of unwanted, unused, or outdated medications. The programs are not for use by businesses or health care facilities.

Nurses work across in-patient and community practice settings where medications are stored, monitored, distributed and disposed of. Universal management guidelines are not available however in some areas health care professionals are working to provide proper guidance. Such settings include home care, school health (Taras, Haste, Berry, Tran & Singh, 2014) and long term care.

RESOURCES REGARDING PHARMACEUTICAL WASTE DISPOSAL

The concern for pharmaceutical waste management is not a new issue. In 1976, the federal [Resource and Recovery Act \(RCRA\)](#) was enacted to protect human health and the environment from the potential hazards of waste disposal. However, pharmaceuticals were not included until about 2004. Since that time enforcement efforts have become stricter and efforts to achieve compliance have strengthened. The act is administered by the EPA.

Both the EPA and Food and Drug Administration (FDA) provide guidance for medication disposal. The following resources offer information for home and hospital use of medications.

- [EPA: Collecting and Disposing of Unwanted Medicines](#)
- [FDA: Disposal of unused medications: What you should know](#)
- [Medication Disposal: Questions and Answers](#)
- [FDA: Safe Disposal of Medications](#)
- [FDA: Information about those medications to flush if absolutely necessary](#)
- [DEA: Controlled Substances](#)
- Hospitals for a Healthy Environment (H2E): [Managing Pharmaceutical Waste: A 10-step Blueprint for HealthCare Facilities in the U.S. \(2006\)](#)

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GREEN TEAMS

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There are a number of names that have been given the committees/groups that have been convened at hospitals to address environmental health and sustainability. One of the most common names is the Green Team. These teams are convened by nurses, administrators, and others. Their make-up can vary, but the most successful ones have representatives from the departments noted below. They can help to raise concerns, do assessments and audits, compare alternative solutions, make recommendations, and help to implement changes.

Watch [Denise Choiniere](#), who was the first Sustainability Manager at the University of Maryland Medical Center, describe how nurses are working on "greening" their hospitals. A great introduction to incorporating environmental health into nursing practice.



The Power of Nurses

- Highest percentage of employees
- Understand the connection between environmental & health
- Precautionary Principle
- Patient Advocates
- Bridge the gap between administrative executives and floor staff
- Find user of most products

Related Autoplay

- Purchasing Department or Committee – make important product selection decisions
- Architects/Planners – often take the lead when rehab, expansions, and new hospital buildings are being planned and developed
- Infection Control – should be consulted when making decisions are being made about cleaners/sterilants/disinfection products
- Occupational Health and Safety – can help provide additional support for decisions
- Food Services – can be instrumental in helping to bring local, sustainably-grown foods to the hospital and when planning/implementing a Farmers' Market
- Public Relations – important to keep in the loop
- Nursing and Professional Development – a good place to help to bring speakers into the hospital to talk about environmental health and sustainability related to health care. Nursing “grand rounds”, lunch-time talks, and other venues can provide great opportunities to have compelling speakers.
- GREEN TEAMS – critical organizational structures in which sustainability and environmental health can be discussed and addressed.

Some hospitals have made institutional commitments to environmental health and sustainability, even including it in their core values statement.

Here's the website for the [University of Maryland Medical Center's Green Team](#)

It's just one example of many, many green team programs. If you google “hospital green teams”, you'll see lots of other examples. (Note, the medical center is conveniently located on Greene Street.)

WHO'S IN CHARGE IN HOSPITALS?

Really, everyone has a part, but there are several offices/ departments/individuals/committees that can be particularly important:

- Environmental Services / Housekeeping / Maintenance – often where the decisions are made about the cleaning processes and products