

Rethinking Phlebotomy

By Karen Titus

Who's minding the phlebotomists?

That's the question--along with many variations on it--being asked by laboratories and hospitals as they work to find ways to make blood collection practices more efficient and economical and, in the process, improve patient care. In their struggle to find answers, the traditional role of the phlebotomist and the practice of phlebotomy are being reexamined and, in some cases, radically altered.

"It's kind of like living on top of an earthquake. Everything is shifting under your feet and nothing stays the same," says Patty Needham, MT(ASCP), quality assessment and improvement manager at SwedishAmerican Hospital in Rockford, Illinois. "We need to adapt to the changing healthcare environment--and we have to find ways to deliver the best care, with our focus on the patient, in care and in cost."

Needham isn't alone in observing dramatic changes, which at many institutions--including SwedishAmerican--has led to the training of nursing staff and patient care technicians (PCTs) to handle the duties traditionally assigned to phlebotomists. Other options range from cross training of healthcare personnel (including phlebotomists) to decentralizing the laboratory to using bar-coded wristbands. All are aimed at improving quality and reducing costs--and all represent a host of challenges for those who perform phlebotomy services.

"Phlebotomists have gotten to a point where they're in a specialist occupation, and as a result they're in a survival battle now because the trend is swinging the opposite way: to combine healthcare responsibilities," observes Raymond L. Olesinski, PhD, MT/PBT(ASCP), assistant professor of clinical laboratory science at the University of Kentucky Center for Rural Health, in Hazard, Kentucky. "Nurses, physicians, respiratory therapists, and others can perform phlebotomies." As a result, he says, many administrators are questioning the effectiveness of retaining a cadre of full-time phlebotomists on staff when phlebotomy responsibilities might be parceled out to other professions as part of their day-to-day responsibilities.

Asks Marilyn Held, MT(ASCP), assistant administrative technologist in charge of quality assurance at St John Hospital and Medical Center in Detroit: "Are institutions going to have a phlebotomy team as we know it today, centralized from the laboratory, two or three years from now? I would say no." She does foresee, however, smaller phlebotomy teams being retained for special procedures, difficult draws, and training of other hospital personnel.

Some institutions are finding that maintaining a full-time phlebotomy staff to handle the majority of phlebotomy tasks remains the best option. That's the case at the Mayo Clinic in Rochester, Minnesota, reports Jane C. Dale, MD, a pathologist with Mayo's Department of Laboratory Medicine and Pathology. "In our setting RNs draw only a small number of specimens," Dr Dale says. "Most of it is handled by our phlebotomy team. I think we do a better job, because we're there 24 hours a day, and we know about labeling, order of draw, correct tubes, all those things required to get a good sample."

Phlebotomists also can be trained in other areas of care. "In one of the outpatient areas we're looking at, where phlebotomy, radiology, and EKG are closely linked, we're looking at expanding the role of the phlebotomist by cross training some of those folks," Dr Dale says.

Emphasizing the importance of proper training and laboratory supervision, Dr Dale advocates use of a professional phlebotomy service "if your size is such that you can accommodate that. If you're a big operation, you're probably doing a lot of different types of tests. The collection requirements in that situation are often quite diverse. Phlebotomists are trained to handle that, while folks who are not laboratory-focused don't necessarily pay attention to all of those requirements."

A 1992 Q-Probes study conducted by the College of American Pathologists on hematology specimen acceptability indicates that laboratory personnel are more likely to collect adequate specimens. The study

analyzed data from 703 institutions; included in the results was a breakdown of the personnel collecting specimens into four categories and the number of rejected specimens for each group.

Laboratory personnel (including phlebotomy services) under the supervision of the laboratory director performed "significantly better" than those in other categories, reports Bruce A. Jones, MD, director of clinical pathology at St Johns Hospital and Medical Center and coauthor of the study. The other categories included in-hospital nonlaboratory phlebotomy personnel, other in-hospital nonlaboratory personnel, and out-of-hospital nonlaboratory personnel.

The study's results should not preclude hospitals from considering shifting phlebotomy responsibilities to nonlaboratory-based personnel or phlebotomists, however. "In a study like this we're looking at large groups from multiple institutions," Dr Jones notes. "Even though the whole database may show that the laboratory personnel do better than the nonlaboratory personnel, in any given institution that may not necessarily be the case."

Proper training of personnel who do phlebotomy procedures--regardless of whether these staff are phlebotomists or other healthcare professionals--remains crucial as institutions look to improve patient care and decrease collection errors while keeping an eye on the bottom line.

At Rush-Presbyterian-St Luke's Medical Center in Chicago, training begins with the hiring process, according to Tom Travers, laboratory supervisor at Rush, an 800-plus bed facility with 44 full- and part-time phlebotomists on the laboratory staff.

"When we hire phlebotomists we weigh heavily customer service attributes, and we always hire people with existing skills," Travers says. Once hired, staff go through 4 to 5 weeks of individualized training, which includes a rotation through the representative nursing stations.

Proper training is perhaps even more critical at those institutions where nonphlebotomists are taking over blood-drawing duties.

"In learning to do phlebotomy well, you can learn the basic technique in the course of a couple of weeks," says Faith Clendenen, MPH, MT(ASCP), of the University of California, San Francisco. "But learning to be truly proficient at it is something that just takes a lot of practice, a good 6 months or so for most people."

At UCSF, which includes two hospital sites, a pilot project begun in January is training patient service assistants (PSAs) to handle a variety of functions, including phlebotomy. "We have real concerns about issues of labeling and specimen collection. Are the PSAs going to be getting the right tubes? Are they going to understand special handling requirements?" says Clendenen, manager of the clinical laboratory.

At SwedishAmerican, the transition to decentralized phlebotomy began in April 1994, with training performed one floor at a time. Initially, only the certified nurses aides were trained as patient care technicians. Then, as the PCTs' work picked up, some members of the housekeeping staff were trained in some of the more basic job duties of the nurses aides and given the job description of PST, or patient support technician. Both patient care technicians and PSTs are reporting increased job satisfaction, according to SwedishAmerican's Needham.

By the time training started on the second unit, it had been decided that it would be beneficial to the patient to train the registered nurses as well as the certified nurses aides. The addition of the RNs, and LPNs in some units, has created a better system, Needham says. "Care in each unit can be tailored to the needs of the patient population there."

The phlebotomy staff was reduced by 11 full-time equivalents between May and November of 1994. Phlebotomists were given the option to train as PCTs or in other areas of the system, reports Needham. The remaining phlebotomists handle the large outpatient laboratory workload, as well as the hospital's nursing home clients.

Restructuring phlebotomy services can lead to significant improvement, say those whose institutions have undergone such changes.

At SwedishAmerican, many of the improvements are in the area of patient care. The nursing staff knows the patient's status better than a phlebotomist could, and can use that information to the patient's advantage, says Needham. "Some examples of those benefits are, for new admissions, if an IV is started, the RN can collect the admission blood work at the same time, saving the patient an extra stick," she says. "Another example is if a patient has a restless night, the nurse can use her discretion and collect the blood tests earlier, if appropriate, when the patient is still awake. Then when the patient finally falls asleep, he or she can rest."

At University Medical Center, which is affiliated with the Arizona Health Sciences Center in Tucson, Valerie Evans, MT(ASCP), SH, associate director of pathology, reports that the benefits of reorganizing phlebotomy services have included reduced costs and improved communication between the laboratory and the nursing services, in addition to the aforementioned reduction between time of order and time of specimen collection.

Evans does report a slight increase in the number of mislabeled specimens as a result of the changes. "It's still a very small percentage, but because it's such a significant risk management issue, we have focused a CI project on eliminating labeling errors," she says.

In the past, when laboratory phlebotomists made errors, "You went over those errors with the staff daily. You were giving them constant feedback," Evans says. Despite an elaborate system to monitor specimen quality, which includes detailed monthly reports on reasons for specimen rejection, "With everyone up on the floors, we only have the opportunity to meet for 20 minutes once a month with select representatives. We have to hope that they go back and educate everybody on their nursing service."

Management of staff who perform phlebotomies is a key issue even at hospitals that have undergone less radical shifts, such as point-of-care testing and use of pneumatic tube systems.

At William Beaumont Hospital in Royal Oak, Michigan, the implementation of a pneumatic tube system as well as a new computer system has allowed for the introduction of what Frederick L. Kiechle, MD, PhD, calls "decentralized phlebotomy."

"With the availability of the tube system and also bar-code printers for identifying test tubes, phlebotomists are able to travel around without being tethered to the lab. They don't have to come back and drop things off," says Dr. Kiechle, of the Department of Clinical Pathology at Beaumont. "They can print their labels, call up their labels--which is really their phlebotomy work list--and go about the business of phlebotomy, sending the specimens down through the central tube."

One of the drawbacks of having these "roving" phlebotomists, Dr. Kiechle says, is that "they have an opportunity to forget who they work for, especially if they return to the laboratory infrequently. Perhaps if they work in an ICU setting, there is potential for them to become attached to the patient population. That's not bad, but the nursing goal--puncturing the patient as little as possible--may be counterproductive to getting an adequate sample." Although that hasn't been the case at Beaumont, Dr. Kiechle says, he reports seeing it happen at other institutions.

Appropriate feedback regarding performance is key to reducing rejected specimen rates, and may help labs reassert some control. At Beaumont, which has had a point-of-care testing program for 6 years, "We now have two full-time employees whose only function is to keep track of nonlaboratory personnel who do lab tests," Dr. Kiechle says. He also credits cost analysis studies conducted at Beaumont with improving efficiency.

Needham has noticed a slight increase in unlabeled and mislabeled specimens during the transition at her hospital. Such problems are handled with an internal form that is filled out in the laboratory, with a

copy sent to the nurse manager of the unit where the incident occurred. "It's an educational tool, with direct feedback, and it is working quite well," she says.

None of the hospitals undergoing major shifts in their phlebotomy services report an increase in wristband errors. Yet patient identification remains a central issue in phlebotomy services, and a 1993 CAP Small Hospital Q-Probes study on the subject, coauthored by Mayo's Dr. Dale and Stephen Renner, MD, had some surprising results for many participants.

The total error rate for all participating institutions combined was 5.7%. By far the biggest problem was an absent band, accounting for 64.6% of the errors. Other problems included missing information (12.4%), more than one band (12.1%), wrong information (6.7%), illegible information (3.5%), and patients wearing another patient's band (0.7%).

"There is some worry that there may be more errors than those we detected in the study," adds Dr. Dale. "The concern is, is this just the tip of the iceberg?"

As with improving specimen collection, the keys to correcting errors include monitoring performance and providing feedback. Phlebotomists, the study notes, play a "key role in identifying wristband errors. Patient identification is the most important step in the phlebotomy procedure. This must be emphasized during the training of all personnel involved in the collection of patient specimens."

At the Tucson VA Medical Center, for example, the hospital began tracking wristband errors following participation in a 1991 Q-Probes study, in which the hospital ranked in the lower percentiles for all wristband errors. Using daily tally sheets, phlebotomists noted the various types of wristband errors, stratified by location.

"We had a large number of wristband errors, much larger than we ever anticipated," says Ron B. Schiffman, MD, director of clinical pathology, Department of Pathology, at the Tucson VA.

"What we found is that certain locations had more problems than others," Dr. Schiffman explains. "For example, patients with extended stays, like in our drug and alcohol rehabilitation location, were more likely to have wristbands missing. And in other areas, such as the surgical intensive care unit, often wristbands might be cut off because of a procedure and not put on again.

"But once we identified a location, we could target a specific nursing team and ward secretary, point out the problem, and move to correct it," Dr. Schiffman continues.

Using bar-coded wristbands also has the potential for decreasing patient identification errors, says Dr. Dale, although in practice their use remains "extremely rare. I see that as a real opportunity to improve efficiencies once we can demonstrate that it's cost-effective."

And while bar-coded wristbands may circumvent some of the problems with wristband illegibility, says Dr. Schiffman, "There still needs to be some kind of ward intervention--nurse, ward secretary, someone--to make sure that the proper bar-code identification is put on the patient. Improvement involves phlebotomists--and everyone else."

Karen Titus is a freelance writer in Chicago. This article is excerpted, with permission, from the March 1995 issue of CAP TODAY, the monthly newsletter of the College of American Pathologists.

Certification Programs for Phlebotomists:

- American Society of Clinical Pathologists (ASCP) Board of Registry
Test given: Offered on computer throughout the year in 3-month examination periods
Fee: \$60

For more information write: P.O. Box 12270, Chicago, IL 60612-0270 or call (312) 738-1336.

- National Certification Agency for Medical Lab Personnel (NCA) of the American Society for Medical Technology (ASMT)
Test given: January and July
Fee: \$50

For more information write: P.O. Box 15945-289, Lenexa, KS 66285 or call (913) 438-5110.

- American Society of Phlebotomy Technicians (ASPT)
Test given: At ASPT seminars around the country, when 20 or more in one area register for an exam, or if a proctor can be arranged to give the exam locally for less than 20
Fee: \$70

For more information write: P.O. Box 1831, Hickory, NC 28603 or call (704) 322-1334.

- National Phlebotomy Association (NPA)
Test given: At various sites throughout the country when there are enough registered for the exam, and at the NPA national education conference
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Editorial Commentary

"The times they are a-changin'"--Bob Dylan

LAB NOTES, too, is changing to include more information on alternate-site care, downsizing, and cross-training of healthcare professionals. The primary focus of *LAB NOTES* has always been safety, and will continue to be so--only now we will be concentrating on safety in the era of managed care. Therefore, we are also expanding our circulation to include the healthcare professionals who are responsible for the safety of the many categories of employees who now perform specimen collection and handling.

This issue includes an article entitled "Rethinking Phlebotomy," which reflects the changes that are being made in the collection of specimens for laboratory testing. In the "In Control" section you will find "New Rise in Infectious Diseases," which is a major concern for all of us healthcare professionals, and there is an accompanying article on hand washing--the first line of defense against the spread of infectious diseases.

In Control

Special Section: Practical Information Concerning Efforts to Understand and Control Infectious Disease

New Rise in Infectious Diseases

Dramatic changes in society, technology, and the environment, together with the diminished effectiveness of certain approaches to disease control, have propelled this nation and the rest of the world into a new era; the spectrum of infectious disease is expanding and many infectious diseases once thought conquered are increasing.

Infectious diseases, once believed to be nearly eliminated by modern medicine, are on the rise in the United States and remain the leading cause of death worldwide. Infectious diseases in the US had declined dramatically earlier this century and that trend was expected to continue. In 1980, infectious disease was the fifth leading cause of death in the US, but by 1992, it had moved to the third spot, after heart disease and cancer.¹

Old ailments that we thought had been vanquished, like whooping cough and tuberculosis, are making a comeback, often in virulent new forms that resist previously successful medicines. Joining them are previously unknown plagues, like the Ebola virus featured in Robert Preston's "The Hot Zone," or the Hantavirus outbreak in New Mexico in 1993 that spread to 15 states, causing the deaths of at least 25 people. And, of course, HIV.

Emerging infectious diseases are diseases of infectious origin whose incidence in humans has increased within the past two decades or threatens to increase in the near future.²

There have been at least 11 lethal outbreaks of emerging--or re-emerging--diseases around the world since 1990. An intestinal parasite, *Cryptosporidium*, felled 403,000 people in Milwaukee in 1993, the largest attack of waterborne illness in US history. Russia suffered 50,000 deaths last year from diphtheria, a disease that had supposedly been conquered. Other recent outbreaks of infectious diseases include whooping cough, Rift Valley fever, cholera, dengue fever, yellow fever, anthrax and Lassa fever.

Joshua Lederberg, a Nobel Prize-winning biologist, has likened the situation to a race for survival between humans and microbes: "The question is, will we get them before they get us? We're beginning to lose ground."³

Many factors, or combination of factors, can contribute to disease emergence. Some factors are obvious: population growth, especially in Third World countries, has jammed millions of people together, favoring contagions like tuberculosis, spread through close contact. Then there's modern transportation with tens of thousands of people flying around the globe daily. Now maladies that used to afflict only poor, tropical countries, leap across oceans and time zones to enter the United States. AIDS, today's equivalent of a medieval plague, began in Africa, traveled to North America, and is now infecting Asia on a massive scale. Malaria, which causes a million deaths a year, has returned to Florida and southern California. A ship bearing the cholera virus in its bilge water infected shellfish in Peru; an aircraft then carried a dozen sick people from Lima to Los Angeles. Modern transportation also moves food around the planet very quickly, and fruits that you would wash, peel and boil in a developing country are now available in your local supermarket.

Some factors are less clear: man's encroachment on nature may be stirring up lethal microbes. Experts theorize Ebola emerged from the African wilderness, via an animal carrier, when man cut too deeply into the forest. The growth of suburbs in wooded areas frequented by deer and ticks spread Lyme disease throughout the northeastern United States.

And some causes are microbiological: virulent bacteria, bent on survival like any organism, are rapidly mutating to strains that are resistant to today's antibiotics. Some bacteria have developed resistance to multiple antibiotics and one strain of *Staphylococcus* is resistant to most currently available antibiotics. The resistance problem goes beyond doctors overprescribing antibiotics. Recent changes in agriculture

have led to increased use of antibiotics to enhance growth and prevent illness, creating resistant bugs in animals that are then passed on to humans.

Doctors and the public were feeling overly confident about infectious diseases a decade ago and so, too, were the drug companies. With more than 100 antibiotics on the market and most bacterial diseases on the run, if not on the verge of eradication, many pharmaceutical companies abandoned new antibiotic research to focus on cancer and viral diseases.

To effectively address emerging infectious diseases the Centers for Disease Control and Prevention (CDC) has developed a strategic plan emphasizing surveillance, applied research, and prevention activities critical to maintaining a strong defense against infectious diseases that affect, or threaten to affect, the public's health. The goals of this plan are as follows:

- Goal I. **Surveillance:** Detect, promptly investigate, and monitor emerging pathogens, the diseases they cause, and the factors influencing their emergence.
- Goal II. **Applied Research:** Integrate laboratory science and epidemiology to optimize public health practice.
- Goal III. **Prevention and Control:** Enhance communication of public health information about emerging diseases and ensure prompt implementation of prevention strategies.
- Goal IV. **Infrastructure:** Strengthen local, state, and federal public health infrastructures to support surveillance and implement prevention and control programs.

This plan reflects the CDC's commitment to meet the challenge of important emerging public health problems. The need to proceed rapidly is made more urgent by a number of diseases that pose an immediate danger: methicillin-resistant *Staphylococcus aureus*, a common cause of hospital infections, may be developing resistance to vancomycin; penicillin resistance is spreading in *Streptococcus pneumoniae*; cholera will likely be introduced into the Caribbean islands from the current pandemic in Latin America, and the new strain, *Vibrio cholerae* 0139, is spreading throughout southern Asia. Changing food industry practices, dietary choices of the American people, and globalization of food supplies will bring new challenges to providing a diet safe from pathogens such as *Salmonella* sp and *E coli* 0157:H7. These infectious disease problems demonstrate the urgency for expeditiously implementing this plan.⁴

It is crucial that emerging infectious diseases be addressed and that the basic tenets of prevention-oriented public health policy form an integral component of our nation's efforts to safeguard health in our communities.

Examples of Emerging Infectious Diseases, United States, 1993²

- *E coli* 0157:H7 disease
- Cryptosporidiosis
- Coccidioidomycosis
- Multidrug-resistant pneumococcal disease
- Vancomycin-resistant enterococcal infection
- Influenza A/Beijing/32/92
- Hantavirus infections

Examples of Emerging Infectious Diseases, Outside the United States, 1993²

- Cholera in Latin America
- Yellow fever in Kenya
- *Vibrio cholerae* 0139 in Asia
- *E coli* 0157:H7 in South Africa and Swaziland

- Rift Valley fever in Egypt
- Multidrug-resistant *Shigella dysenteriae* in Burundi
- Dengue in Costa Rica
- Diphtheria in Russia

References:

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3. Boyd RS. Will we get the microbes? *Rochester Post Bulletin*, Knight-Ridder Newspapers, April 5, 1995.
4. Centers for Disease Control and Prevention. *Addressing Emerging Infectious Disease Threats: A Prevention Strategy for the United States*. Atlanta, Georgia: US Dept of Health & Human Services, Public Health Service, 1994.

Medical Lore

Early Pathology

This article continues our excerpts from Dr Elmer Koneman's book, Hey Lab Boy. Dr Koneman has an extensive background in clinical pathology, and is currently Professor of Pathology at the University of Colorado School of Medicine, and Section Chief of Clinical Microbiology at the Denver Veterans Affairs Hospital.

In parallel with developments [in the examination of tissue and cell types around the middle of the 19th century], the foundations of a new discipline, later called **clinical pathology**, based on the examination of body fluids rather than on the study of solid organs and tissues, were also being formed. The initial impetus came through microbiology. Several discoveries were contradicting the centuries-long theory of spontaneous generation. As early as 1835, Schwann [see Who's Who sidebar for the names presented in this article] recognized that yeasts were living organisms and that fermentation and putrefaction processes were due to airborne bacteria. Semmelweis had recognized the microbial cause of puerperal fever, and Sch-nlein had shown that favus skin infections were caused by fungi.

The discovery by Pasteur, during the period 1857-1862, that various fermentations were caused by different bacteria, was prerequisite to the later discovery by Koch that diseases such as anthrax and tuberculosis were, in fact, also caused by bacteria. By applying the aniline dyes discovered by Weigert, and the differential stain discovered by Gram, Koch and other microbiologists were now able to diagnose infectious diseases by detecting the telltale bacteria in smears prepared from biological fluids and purulent exudates. In 1884, Frau Hesse discovered the use of agar as a solidifying agent in culture media so that different bacterial species could be isolated from clinical specimens and individually studied. Parallel advances were also being made in the understanding of animal parasites, their life cycles and relationships to human disease, so that by the end of the 19th century, clinical microbiology had evolved into an intricate science by which the causes and effects of many infectious diseases were clearly elucidated.

Developments in the chemical analyses used in clinical laboratories can be similarly traced. The human eye was used in visualizing color changes of reaction mixtures to detect the presence and quantity of biological substances in blood serum and other body fluids (a practice that actually dates to the middle ages when physicians visually examined urine in special flasks for color changes or precipitates, allowing them a certain degree of prognostication). This was followed by the introduction first of the optical colorimeter, through which color differences between the unknown sample and a colored standard could be visualized. This technology was later replaced in clinical laboratories by more sophisticated electrically balanced photometers and spectrophotometers to achieve the accuracy, precision and sensitivity necessary to make proper diagnoses.

Richard Bright at Guy's Hospital in London had made urinalysis a well-developed science--albumin, color, specific gravity, tasting of sugar, deposits of color and characters were routinely measured in his laboratory. Similarly, George Dock at the University of Michigan described the practice of urinalysis in this country. Albumin and glucose were the chemical constituents of real importance; urea and uric acid also received some attention, although their physiologic mechanisms and clinical significance were not clear. Much attention was paid to the observation and identification of crystals and casts.

By combining all these findings, clinical laboratory workers were able to recognize the chief types of kidney disease (which at that time were chiefly suppurative pyelonephritis and renal tuberculosis). Urine sediments were initially allowed to settle out by gravity in a test tube; later, centrifuges driven either manually by turning friction wheels or by water power were available (models driven by electric motors were just on the horizon). Dr. William Osler had an interesting method to obtain urine sediments from his patients. He placed a urine sample into a small bottle with a cork stopper, which he inverted and placed in his pocket. By the time he arrived in the laboratory, he carefully turned the bottle right side up, withdrew the cork and spread on to the surface of a glass slide the sediment clinging to the underside of the cork.

Hemoglobin measurements, counting of blood cells and differential stains of blood smears were also routinely performed in many laboratories by the end of the century. The chemical measurements of blood components and the fields of immunohematology and blood banking came much later.

WHO'S WHO IN EARLY PATHOLOGY

Richard Bright (1789-1858) -- British physician; the first to describe the clinical manifestations of the kidney disorder known as Bright's disease or nephritis

George Dock (1866-1951) -- professor of theory and practice of medicine and clinical medicine and pathology, at the University of Michigan

Hans Christian Joachim Gram (1853-1938) -- Danish physician; developed method of staining (gram-negative, gram-positive)

Fannie Eilshemius Hesse -- born in the US of German heritage; known for her idea to use agar rather than gelatin when working with microbial colonization

Robert Koch (1843-1910) -- German physician and bacteriologist; discovered the bacterial causes of anthrax and cholera, and discovered the tubercle bacillus for which he received the Nobel Prize in 1905

Sir William Osler (1849-1919) -- Canadian-born physician; foremost advocate of aligning clinical medicine and pathology; known for his work in malarial and filarial diseases, and for his studies on blood platelets

Louis Pasteur (1822-1895) -- French chemist; founder of microbiology, virology and immunology, whose work enabled Joseph Lister to develop antiseptic surgery

Johann Lukas Sch-nlein (1793-1864) -- German physician; the first to use the microscope in conjunction with chemical analyses of urine and blood in the diagnosis of disease; known for his work regarding purpura rheumatica

Theodor Schwann (1810-1882) -- German anatomist and physiologist; founded modern histology by defining the cell as the basic unit of animal structure; coined the term metabolism for the chemical changes that take place in living tissue

Ignaz Philipp Semmelweis (1818-1865) -- Hungarian physician; discovered the cause of puerperal fever and introduced antiseptics into medical practice

Karl Weigert (1845-1904) -- German pathologist; known for his law regarding the overproduction of elements in the reparative process, and for his various staining methods

This concludes our historical look at the development of the science of clinical pathology, as seen through the eyes of Dr. Koneman. We thank Dr Koneman for allowing us to include these excerpts in LAB NOTES.

Simple Hand Washing Gets New Scrutiny for Disease Control

The following article appeared in *The Wall Street Journal*, issue of February 5, 1996.

The resurgence of infectious diseases and their growing resistance to antibiotics are renewing the need for low-tech health practices. Like hand washing.

Obvious? Perhaps. But a rash of reports in the *Journal of the American Medical Association*, *Lancet* and other medical journals cite studies linking the breakdown of basic hygiene to outbreaks of bacterial and viral illness in hospitals, nursing homes and child-care centers.

Common culprits passed hand-to-hand cause winter colds and flu, gastric upsets and ear infections. Adding danger to this misery index, drug-resistant strains of *streptococcus pneumoniae* (which causes pneumonia), *staphylococcus aureus* (which causes toxic shock and other infections) and *enterococcus* (which causes diarrhea) are plaguing hospitals.

"After touching a patient, doctors and nurses may wash their hands 50% of the time," says Elaine Larson, Dean of the School of Nursing at Georgetown University. "We know what we're supposed to do, but we don't do it." It's not a knowledge problem but a behavioral one.

"It's discouraging," Ms. Larson says, adding that soap and water rates the lowest compliance of proven antiseptic tools in medicine. Consumers need to let doctors and hospital, nursing home and day-care personnel know they care as much about infection control as convenient hours, or current magazines in the waiting room. "How many doctors and nurses would ignore a patient's request that they wash their hands first?" asked William Jarvis of the US Centers for Disease Control and Prevention in a recent editorial in *Lancet*.

Oddly enough, hand washing is a relatively recent addition to Western medicine. It was only 150 years ago that Ignaz Semmelweis scandalized Viennese physicians by suggesting they scrub between patients. No one believed him until their compliance with his crackpot idea ended an epidemic of childbed fever and maternal deaths. A century and a half later, as medicine's antibiotic crutch cracks, Dr. Jarvis and others in public health are reprising Dr. Semmelweis's lesson.

So what do you do, when you're visiting the doctor, or choosing a nursing home or a day-care center? What if you see people fail to scrub between patients? Or witness a harried day-care worker mingle diapering duties with food service?

"Asking, 'Have you washed your hands?' will force a lot of physicians and nurses to wash their hands. If they become angry or indignant about it, it's probably an indication that they didn't do it," says Dr. Jarvis. It's a difficult thing to ask but Dr. Jarvis encourages consumers to exert pressure. Family members can take the heat off hospital patients by asking for them. It's timely now, when cost-conscious hospitals may be cutting staff. Hand washing and other infection-control techniques can be dismissed by a harried nursing staff, he says. So be observant about the patient-to-nurse ratio, especially if you have family or friends in an intensive-care unit.

Day-care centers--which can become petri dishes for winter colds and flu--deserve scrutiny, too. Happily, however, many are getting wise to infection control. *Physician's Weekly*, a trade publication for doctors, recently ran a series on infection control illustrated with a photo of a Manhattan day-care center. A day-care worker was shown diapering a toddler with gloved hands. This isn't overly cautious behavior. A Finnish study showed hand washing and assigning staff separately to diapering and snack details in day-care centers slashed the rate of toddler illness.

True, diligent doctors and nurses often scrub 40 times a day, leaving hands chapped and raw. But if you see lapses in infection control, speak up--or go elsewhere. That's what Donald Goldmann of Boston did. "I once took a relative to a urologist for an evaluation," he says. Spotting a hand-washing product that he knew was prone to contamination, he says, "I had my relative get dressed and we left."

It doesn't hurt that Dr. Goldman is an epidemiologist and head of quality control at Children's Hospital in Boston. There, during an outbreak of respiratory illness among infants, Dr. Goldman found doctors and nurses observed good scrubbing and gloving practices only 39% of the time. After an education program, their technique improved and illness subsided. He demands the same fastidious care for his family, and advises everyone to do likewise.

What about the everyday activities of life? Everyone has seen people bolt out of the bathroom sans soap and water. Whether shaking hands, paying for coffee or scooping sprouts at a salad bar, people exchange microbes all the time; more so if they shun the faucet, obviously. Touching the eyes, nose or mouth with a germ-laden hand frequently starts an illness.

Experts aren't immune to the problem of passing microbes mano a mano. At an infectious disease meeting, researchers were themselves studied as they left the conference restroom--and found remarkably casual about hand washing.

But don't fear offending professionals. Being attentive to their technique might get you better care, Dr. Goldman says. Try his gentle prompt: "Wait, I know you're busy, but I want to remind you you're wearing the same gloves from your last patient."

If the computer industry can institute clean rooms, he says, health care should do no less.

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Becton Dickinson VACUTAINER® Systems New Products News

VACUTAINER® PLUS SST® and PST™ Tubes

To increase employee safety, many VACUTAINER® Brand blood collection tubes are now available in a plastic material significantly more durable than glass--even under extreme conditions. VACUTAINER® PLUS SST® Tubes are plastic tubes for serum separation and VACUTAINER® PLUS PST™ Tubes are for plasma separation. Breakage resistance has been proven superior to that of glass tubes, both in drop-test and centrifugation comparisons.*

The SST® tube is an excellent choice for transporting both inpatient and outpatient specimens, and is available with double gel for specimen transport under stressed conditions. With the PST™ Tube, plasma samples are ready for analysis in 10 minutes--ideal for STATs and faster turnaround time.

Both tubes have the additional safety benefit of the HEMOGARD™ Closure, an engineering-control stopper that reduces the possibility of exposure to blood specimens. For more information, contact your Becton Dickinson VACUTAINER Systems sales representative or use the enclosed reply card.

*Data on file. Becton Dickinson and Company, Franklin Lakes, New Jersey.