This year alone, about five percent of those treated at the Joseph M. Still Burn Center were classified as non-burn patients—people presenting acute symptoms of conditions resulting from antibiotic-resistant bacterial infections ranging from Methicillin Resistant Staphylococcus Aureus (MRSA), necrotizing fasciitis (NF), and Neisseria meningitidis, to drug-induced reactions such as Stevens-Johnson Syndrome and Toxic Epidermal Necrolysis Syndrome (TENS). This percentage correlates to arising national trend in the overall incidences of acute infectious diseases as the result of multi-drug resistant organisms (MDROs).

While much work has been done to educate the medical community in regards to diagnosing and treating patients suspected of these, counteractive factors that prevent or prolong the diagnosis/treatment process have also emerged. These include:

- The continuous and rapid evolution of new antibiotic-resistant organisms;
- A rising trend in patients "self-medicating" with prescribed drugs, thereby unknowingly increasing their resistance to antibiotics and/or increasing their chances of an acute drug reaction;
- A marked increase in the number of people unable to access/afford healthcare who delay treatment until their symptoms are acute, often life-threatening.

For example, let’s examine Methicillin Resistant Staphylococcus Aureus (MRSA), beginning with how these “counteractive” phenomena have affected its rise. Although first recognized as a virulent pathogen affiliated with health care institutions, community-associated strains of MRSA (CA-MRSA) have emerged over the past several years in young, healthy patients without significant health care contact. These isolates carry a distinct molecular makeup and lack the multi-drug resistance pattern harbored by health care strains. Community-associated or, CA-MRSA predominantly induces skin and soft tissue infections, though the presence of unique virulence factors may cause potentially lethal necrotizing pneumonia and other invasive infections—more acute conditions traditionally treated in a burn center.

In its earliest stages, symptoms of MRSA appear as small red bumps that resemble pimples, boils or spider bites. These can quickly turn into deep, painful abscesses that require surgical draining. Sometimes the bacteria remain confined to the skin. But they can also infiltrate deep into the body, causing potentially life-threatening infections in bones, joints, surgical wounds, the bloodstream, heart valves and lungs.

When presented with a potential MRSA patient today, physicians must now first distinguish between Healthcare-associated (HA) or CA-MRSA. The infection should be further identified as belonging to one of four groups: A) superficial colonization of a wound without signs of infection; B) superficial...
As the incidences of healthcare- and community-acquired antibiotic-resistant diseases continue to rise, so has the need for education of their assessment and treatment. In fact, current data from the U.S. Centers for Disease Control (CDC) reveals that the largest proportion of S. aureus-related discharge diagnoses occurred in patients from the South. Given this alarming trend, many studies now indicate that treating patients diagnosed with these conditions and a variety of others in a burn center environment is both prudent and preferable.

In this issue, we discuss this growing trend and offer information to help frontline physicians and healthcare professionals better identify, assess and treat patients with acute symptoms potentially related to drug-resistant and drug-induced conditions. Equally important, we encourage all medical professionals charged with assessing patients such as these to contact us with questions—both patient-specific and/or related to general management/treatment concerns. Our multi-disciplinary team of specialists is available 24 hours a day, seven days a week, to aid you in the diagnostic and treatment process. Should your patient require acute care here at the Burn Center, we can help facilitate his or her transfer.

Also included in this issue, we offer helpful information on risk factors for several non-burn conditions mentioned in the lead article, as well as symptoms and ways to minimize transmission of potentially deadly bacteria in the healthcare environment. Together, we believe we can impact this rising trend; we're here to help.

R. Fred Mullins, M.D.
Medical Director
Joseph M. Still Burn Center

From the Director’s Desk

We, the entire team of staff, colleagues and associates at the Joseph M. Still Burn Center, mourn the loss of a great friend—Charles DeVaney.

DeVaney, executive director of the Southeastern Firefighters’ Burn Foundation, Inc. at the time of his death, suffered a fatal heart attack this past January while traveling home from a Burn Foundation fundraising trip in South Carolina. A former Augusta mayor among many other distinctions, Charles had served as the Burn Foundation’s director for five years. Under his leadership, the non-profit grew from a small volunteer organization with an annual budget of about $350,000 to an invaluable community resource with an annual budget of $600,000 in 2006. Today, the Burn Foundation provides medications, transportation, special garments, meals and lodging to the families of burn patients being treated at the Joseph M. Still Burn Center. Just prior to his passing, Charles had initiated plans for a 23-bed expansion of the Jeff Chavis House at the Shirley Badke Retreat, a Burn Foundation-sponsored lodging facility for burn patient families.

“Charles was a statesman and dedicated servant to the Joseph M. Still Burn Center and the Augusta community as a whole. Though he will be tremendously missed, his legacy will live on for years to come,”

— R. Fred Mullins, M.D., Medical Director of the Joseph M. Still Burn Center at Doctors Hospital.
Continued from page 1

The Burn Center’s Role in Non-Burn Treatment

Soft tissue infection/cellulitis; C) complex skin and skin structure infection; and D) osteomyelitis. All but the first category could potentially require the specialized care provided in a burn center, including aggressive debridement of necrotic and infected skin and deep soft tissue structure prior to administration of appropriate antibiotic therapy. In cases of HA- or CA-MRSA resulting in osteomyelitis, aggressive surgical resection of infected bone and soft tissue should be performed as soon as possible.

Necrotizing Fasciitis (NF) is another of the acute bacterial infections often referred to the Burn Center for treatment—largely due to the difficulty both patients and physicians have recognizing its symptoms in early stages of the infection. Being rare, and with an onset that resembles flu-like symptoms, its diagnosis is often missed until the infection has advanced. One alerting sign is unusually severe pain—far greater than normal for a cut or wound—and painful lymph nodes. For example, a cut on the toe or a surgical leg wound, followed some hours later by severe pain either in the toe, leg, or in the groin (as the infection travels to the lymph nodes), can warn of this potentially deadly, fast-spreading infection.

The Burn Center is also seeing larger numbers of patients with Neisseria meningitidis—a Gram-negative bacterium that causes meningococcal disease. Although meningococcal disease presents most commonly as meningitis and/or meningococcemia, if unchecked, it may progress rapidly to purpura fulminans, shock, and death. To complicate matters, recent studies indicate a rise in purpura fulminans in association with Staphylococcus aureus. Traditionally a rarity, many identified strains of S. aureus—associated purpura fulminans have been noted to produce a superantigen that can cause a septic or “toxic” shock by releasing inappropriately massive amounts of cytokines from macrophages and T cells.

In the area of drug-reactive conditions often seen here, Stevens-Johnson Syndrome (SJS) is a potentially deadly skin disease that usually results from a drug reaction. Another form of the disease is called Toxic Epidermal Necrolysis Syndrome (TENS), and it also usually results from a drug-related reaction. Both forms of the disease can be deadly as well as very painful and distressing. In most cases, these disorders are caused by a reaction to a drug—one drug already specifically linked to these disorders is the Cox-2 inhibitor, Bextra. Other drugs that have been linked to SJS include: other NSAIDS (non-steroid anti-inflammatory drugs), Allopurinol, Phenytoin, Carbamazepine, barbiturates, anticonvulsants, and sulfa antibiotics. The condition can sometimes—although not very often—be attributed to a bacterial infection, and in some cases, there is no known cause for the onset of SJS or TENS.

Although SJS can affect any age group, it most commonly occurs in older people as they tend to use more of the drugs associated with the disease and are therefore collectively more at risk. People who have AIDS are also at an increased risk and can present with non-specific symptoms such as cough, aching, headaches, and fever. These may be followed by a red rash across the face and the trunk of the body that can continue to spread to other parts of the body. The rash can form into blisters in places such as the eyes, mouth and vaginal area. The mucous membranes can become inflamed, and with TENS, layers of the skin may peel away easily and/or often detach in sheets. In some cases, the hair and nails may also peel. Sufferers may also feel cold and feverish. With Toxic Epidermal Necrolysis Syndrome, the most common cause of death is infection that enters through the exposed areas. This disease can leave the skin looking as though it has been burned, and areas where skin has sloughed away can seep copiously and quickly.

In summary, while the diseases mentioned in this article represent only a sampling of the type of non-burn conditions routinely treated at the Burn Center, it is clear that their diagnoses and early treatment is not only critical, but a task made more difficult by the number of conditions which initially present with similar symptoms. To that end, the Burn Center encourages all physicians to contact us when attending to patients suspected of having any of these conditions. Again, early detection is the key. Knowing which stage of progression the patient is currently undergoing and how quickly his or her condition may progress is also crucial to achieving the best outcome possible. If ever in doubt, don’t hesitate to call the Burn Center.
Managing Acute Bacterial Skin Disorders

Generally speaking, the skin provides a remarkably good barrier against bacterial infections. When bacterial skin infections do occur, they can range in size from a tiny spot to the entire body surface. They can range in seriousness as well, from harmless to life threatening. Below is a brief overview of several acute skin disorders that may be best managed and treated in a burn center.

**Purpura Fulminans**

**Definition:** An acute illness commonly associated with meningococcemia or invasive streptococcal disease characterized by widespread, severe purpura with extensive tissue damage and sloughing of the skin, and/or gangrene. Purpura are skin lesions that may be many centimeters in diameter caused by the leakage of blood into the skin. Purpura fulminans is not a specific diagnosis, but a syndrome. Although probably caused by an inherited or acquired abnormality of the protein C anticoagulant pathway, it is most commonly a complication of severe bacterial infection such as meningococcemia.

**At Risk:** The age-specific incidence of meningococcemia is highest in young children, although maternal antibodies usually protect infants in the first few months of life. About one-third of cases of meningococcal disease occur about equally in both adult males and females, with higher risk associated with college students, military/recruit populations, and people of African American descent.

**Symptoms:** Fulminant meningococcemia is associated with a purpuric eruption. Hemorrhages may appear on the buccal mucosa and the conjunctivae. Less frequently, this form presents as purpura fulminans. Rarely, no skin lesions occur. Symmetric peripheral gangrene has been described in this form. Typically, signs of meningitis are not present. However, cyanosis, hypotension, and profound shock eventually appear. Patients with the fulminant form of meningococcemia usually present with a high fever (average temperature of 40.6°C). The blood pressure is lowered, and pulmonary insufficiency develops within a few hours.

**Diagnosis:** Collect blood cultures (2 sets, with at least 10 mL per bottle) in any febrile patient with a petechial rash. A study of adults with fulminant meningococcemia showed that 4 variables presenting at the time of admission were associated with a fatal outcome. The odds ratio was 2, and the CI was 1.5-2.7. These are: 1) plasma fibrinogen level of 1.5 g/L or less (sole adverse prognostic variable); 2) factor V concentration of 0.2 or less; 3) platelet count lower than 80 X 10^9/L; and 4) cerebrospinal fluid (CSF) leukocyte count of 20 X 10^9/L or less. Gram stain of the peripheral blood buffy coat may reveal gram-negative diplococci in fulminant meningococcemia.

**Treatment:** Fulminant meningococcemia is the most life-threatening form of the disease, and it may be the most difficult to recognize in the early stages. Patients with fulminant meningococcemia are likely to be hypotensive and have a severe coagulation abnormality consistent with disseminated intravascular clotting. Perform a lumbar puncture on presentation, even though most of the findings other than the culture may be unremarkable. Care for patients with this form in an intensive care setting where frequent monitoring is readily available. Initiate appropriate antimicrobial therapy as soon as possible. Therapy is also directed at correcting circulatory collapse and maintaining renal function. Ischemic complications of fulminant meningococcemia may require surgical care for management.

**Staphylococcal Scalded Skin Syndrome**

**Definition:** A contagious staphylococcal skin infection in which the skin peels off as though burned.

**At Risk:** Occurs almost exclusively in infants, young children, and people with a weakened immune system.

**Symptoms:** Isolated, crusted infection that may look like impetigo. In newborns, infection may appear in diaper area or around stumps of the umbilical cord. In adults, infection may begin anywhere. In all people with this disorder, scarlet-colored areas appear around the crusted area within a day of infection onset. These areas may be painful. Soon, other large areas of skin distant from initial infection redden and develop blisters that break easily. The top layer of the skin then begins peeling off, often in large sheets, with even slight touching or gentle pushing. Within another one to two days, the entire skin surface may be involved and the person becomes very ill with a fever, chills, and weakness. With the loss of the protective skin barrier, other bacteria and infective organisms can easily penetrate the body, causing what doctors call superinfections. Also, critical amounts of fluid can be lost because of oozing and evaporation resulting in dehydration.

**Diagnosis:** Diagnosis is made by the appearance of skin peeling after an apparent staphylococcal infection. If no signs of staphylococcal infection are observed, perform a biopsy.

**Treatment:** If confirmed, administer antibiotics such as nafcillin or cefazolin intravenously. Treatment continues for at least 10 days. With early treatment, healing takes five to seven days. Skin must be protected to help prevent further peeling; it should be treated as if it were burned.

**Necrotizing Skin Infections**

**Definition:** These include necrotizing cellulitis and necrotizing fasciitis characterized by death of infected tissue (necrosis).

**At Risk:** Necrotizing skin infections begin at puncture wounds or lacerations, particularly wounds contaminated with dirt and debris. Other infections begin in surgical incisions or even healthy skin. Sometimes people with diverticulitis, intestinal perforation, or tumors of the intestine develop necrotizing infections of the abdominal wall, genital area, or thighs.

**Symptoms:** Skin may look pale at first, but quickly becomes red or bronze, warm to the touch, and sometimes swollen. Later, skin turns violet, often with the development of large fluid-filled blisters (bullae). The fluids from these blisters are brown, watery, and sometimes foul smelling. Areas of dead skin (gangrene) turn black. Persons usually feel very ill, have a fever, a rapid heart rate, and mental deterioration ranging from confusion to unconsciousness. Septic shock may ensue.

**Diagnosis:** Diagnosis of necrotizing skin infection is based on its appearance, particularly the presence of gas bubbles under the skin. X-rays may show gas under the skin as well. The specific bacteria involved are identified by laboratory analysis of infected fluid and tissue samples. However, treatment must begin before a doctor can be certain which bacteria are causing the infection.

**Treatment:** Intravenous antibiotic therapy and surgical removal of dead tissue. Large amounts of skin, tissue, and muscle must often be removed, and in some cases, an affected arm or leg may have to be amputated. People with necrotizing infections caused by anaerobic bacteria may benefit from treatment in a high-pressure (hyperbaric) oxygen chamber. Overall death rate is about 30%. Older people, those who have other medical disorders, and those in whom the disease has reached an advanced stage, have a poorer outcome.

The information included in this article was compiled from the following online sources: The Merck Manuals Online Medical Library, the U.S. National Library of Medicine National Institute of Health, and eMedicine from WebMD.
Managing MRSA in the Healthcare Environment

By Jack H. Austin, Jr., MD
Dr. Austin specializes in Internal Medicine and Infectious Diseases and is currently Chairman of the Infection Control Committee at Doctors Hospital in Augusta, Georgia.

Just as the incidences of Methicillin Resistant Staphylococcus Aureus (MRSA) in healthcare environments have increased substantially over the past decade, so has our knowledge of the many factors involved in its transmission. Notably, recent evidence indicates that the control of all multi-drug resistant organisms (MDROs), including MRSA, is a dynamic process that requires a systematic approach tailored to the individual healthcare setting. In short, there is no “one size fits all” plan for bringing MRSA under control, rather a combination of interventions outlined here that can help healthcare professionals define a management and prevention strategy unique to their health services setting.

Overview of Variables
Despite all the literature and intensive efforts to study and stem the rise of MRSA, there is still no one appropriate set of evidence-based control measures that can be universally applied to all healthcare environments. This is largely due to several factors inherent to the challenge. First, the prevalence of MRSA varies temporally and geographically. Secondly, once introduced into a healthcare environment, transmission and persistence are determined by several factors, including: 1) availability of vulnerable patients; 2) selective pressure exerted by antimicrobial use; 3) increased potential for transmission from larger numbers of colonized or infected patients; and 4) the impact of implementation and adherence to prevention efforts.

Components of Strategy
The good news is that once a healthcare facility has assessed its individual problems and potential for transmission and containment, the process of managing and ultimately eradicating MRSA is more standardized. This process requires investigation and/or correctional action in the following areas:

• Administrative Support - A commitment of fiscal and human resources to:
  1) implementing system changes that ensure prompt and effective communications, such as computer alerts that identify patients previously known to be colonized/infected with MDROs;
  2) providing the necessary number and appropriate placement of handwashing sinks and alcohol-containing hand rub dispensers in the facility;
  3) maintaining staffing levels appropriate to the intensity of care required; and
  4) enforcing adherence to recommended infection control practices.

• Education - A committed effort to providing facility-wide, unit-targeted, and informal educational interventions that encourage behavior change through improved understanding of the facility’s problem MDROs.

• Judicious Use of Antimicrobials - The Center for Disease Control (CDC) Campaign to Prevent Antimicrobial Resistance provides evidence-based principles for judicious use of antimicrobials and tools for implementation. It targets all healthcare settings and focuses on effective antimicrobial treatment of infections, use of narrow spectrum agents, treatment of infections and not contaminants, avoiding excessive duration of therapy, and restricting use of broad-spectrum or more potent antimicrobials for treatment of serious infections when the pathogen is not known or when other effective agents are unavailable.

• Surveillance - Surveillance is a critically important component of any MDRO control program in that it provides detection of newly emerging pathogens, monitoring of epidemiologic trends, and measurement of interventional effectiveness.

• Standard and Contact Precautions - Colonization with MDROs is frequently undetected; even surveillance cultures may fail to identify colonized persons due to lack of sensitivity, laboratory deficiencies, or intermittent colonization due to antimicrobial therapy. Therefore, Standard Precautions, such as hand hygiene are essential—even in facilities also using Contact Precautions for MDRO-identified patients. Contact Precautions are intended to prevent transmission of infectious agents spread by direct or indirect contact with the patient or the patient’s environment. They should include the wearing of gowns and gloves for all interactions involving patient contact or potential contact with contaminated areas in the patient’s environment.

• Environmental Measures - Several studies indicate that environmental reservoirs such as surfaces and medical equipment may play a role in the transmission of MDROs. A common reason cited for this type of MDRO contamination was the lack of adherence to facility procedures for cleaning and disinfection. Therefore, monitoring for adherence to recommended environmental cleaning practices is an important step in controlling transmission of MDROs and other pathogens in the environment.

• Decolonization - Decolonization entails treatment of persons colonized with a specific MDRO, usually MRSA, to eradicate carriage of that organism. Decolonization of persons carrying MRSA in their nares has proven successful and generally involves a regimen such as using topical mupirocin alone or in combination with orally administered antibiotics.

The bottom line is that all healthcare professionals must be committed to decreasing MDRO rates to minimum levels; healthcare facilities must not accept ongoing MDRO outbreaks or high endemic rates as the status quo. By selecting infection control measures appropriate to our unique situations, we can achieve the desired goal and reduce the rise of MDROs.

For more detailed information about infection control guidelines to prevent infections and MRSA, visit http://www.cdc.gov/ncidod/dhq.
**What is MRSA?**

MRSA, or Methicillin Resistant Staphylococcus Aureus, is a type of staph bacteria that has become resistant to antibiotics—drugs that have been highly effective against bacterial infections in the past. First identified in the 1960s where it was mainly found in hospitals and nursing homes, because it is a living organism, MRSA has evolved and changed over the years in order to survive. The gradual increase of antibiotic usage and availability, as well as their over-prescription and/or improper use, have encouraged MRSA's persistence.

**How do I get MRSA?**

Because MRSA is spread in a similar way as a cold, anyone can get it either by touching someone or something that has the bacteria on it and then touching your eyes or nose. While MRSA can live on an object for months, proper cleaning methods will kill it. Some of the ways you can get MRSA include:

- Touching the infected skin of someone with MRSA
- Using the personal items of someone who has MRSA such as towels, wash cloths, clothes or athletic equipment
- Being in crowded places where germs are easily spread, such as hospitals, nursing homes, daycare centers, sports locker rooms, or college dorms

You may also increase your chances of getting MRSA if you take antibiotics frequently, take them without a prescription, or take them improperly by missing doses or failing to complete the dose cycle. Today, MRSA is spread from person to person through:

- Active infection - from people who have symptoms
- Carriers - from people who carry MRSA on their skin and or in their nose, but have no symptoms. Physicians often refer to carriers as being "colonized."

**How contagious am I?**

If you have an active infection on your skin, you are contagious. In other words, if someone touches your infection or something that came in contact with your infections such as a towel, that person could get MRSA.

If you are a carrier, you have the bacteria on your skin and/or in your nose. So if you don’t wash your hands properly—especially after touching your nose or mouth such as after sneezing—you could potentially spread MRSA to family, friends, or other people close to you—even pets such as dogs and cats. If there are children in your life, you can still interact with them, but make sure you carefully adhere to MRSA Prevention Guidelines. (See page 7)

**What does “active” MRSA look like?**

Most often, MRSA causes infections on the skin. These may look like any of the following:

- Sores that look and feel like spider bites (although MRSA is NOT caused by spider bites)
- Large, red, painful bumps under the skin called “boils”
- A cut that is swollen, hot and filled with pus
- Blisters filled with liquid, also called impetigo

MRSA can also occur in other areas of the body, including in the blood, lungs, eyes, and urine. These types of MRSA infections are less common but more serious.

**If I have an active infection, how do I keep from spreading it?**

- Do not squeeze or poke your sores.

**How is MRSA treated?**

MRSA should always be treated by a healthcare professional. Even if you don’t show signs of an active infection, you can request an MRSA test to determine whether or not you are a carrier. If you have an active infection, your healthcare provider will likely perform one or more of the following steps:

- Drain the infection
- Give you antibiotics
- Reduce the amount of bacteria on your skin by asking you to shower daily with antibacterial soap, prescribing oral antibiotic and/or nose ointment

To learn more about MRSA, or for more detailed information on prevention and treatment, visit [http://www.cdc.gov/ncidod/dhqp/ar_mrsa_prevention.html](http://www.cdc.gov/ncidod/dhqp/ar_mrsa_prevention.html).
Wash your hands thoroughly; carry alcohol-based hand gel with you to clean your hands when soap and water are unavailable.

Cover your mouth with a tissue when you cough or sneeze, throw it in a wastebasket afterwards, and then wash your hands.

Keep fingernails clean and short.

Change sheets and towels regularly; don’t share towels, razors, toothbrushes, or other personal items.

Because MRSA lives on the skin, it’s important to take good care of yours. That’s because any crack or break in your skin could allow MRSA to enter your body and cause an infection. If you should have a cut or scrape, remember to wash it with soap and water and cover it with a bandage.

Take care of yourself—eat right, exercise, quit smoking, and avoid stress.

Seek medical treatment at the first sign of infection in a cut. Look for redness, swelling, pain or pus.

If you work in a healthcare setting, you may need to take special precautions. Consult your employer.
Save the Date!

20th Annual Southern Region Burn Conference
Nov. 1-4, 2007
Augusta, Georgia
Hosted by The Joseph M. Still Burn Center at Doctors Hospital

Registrations are now being accepted for the 20th Annual Southern Region Burn Conference, November 1-4, 2007, in Augusta, Georgia. Sponsored by the Southern Medical Association (SMA), the conference will be held at the Augusta Marriott Hotel & Suites.

To register or learn more about the conference, contact the Southern Medical Association at www.sma.org, or call 1.800.423.4992.

Outreach News: Taking Burn Care to New Heights

Over 100 medical professionals from throughout the Southeast attended a Winter Burn Symposium in Augusta, Georgia this past February to improve and update their skills for managing burn patients during accident site and inter-facility transfer.

Taking Burn Care to New Heights, sponsored by the Joseph M. Still Burn Center at Doctors Hospital, JMS Burn Centers, Inc., and AirMed, Inc. focused on the critical role of air medical transportation for transferring burn patients. Approved for continuing education accreditation by both the American Association of Critical Care Nurses (AACN) and the Georgia Department of Human Resources, Division of Public Health, the two-day event of scientific sessions concluded with a tour of the Joseph M. Still Burn Center at Doctors Hospital.

To learn about upcoming events or accreditation opportunities sponsored by the Joseph M. Still Burn Center, please visit www.josephmstillburncenter.com or contact Beth Frits 706.364.6400.

If you know of someone who would like to be added to the Burn Care Commentary mailing list, or to make suggestions for future topics, please call 706.364.6400 or email bethfrits@bellsouth.net.