Decolonization in Prevention of Health Care-Associated Infections
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Summary: Colonization with health care-associated pathogens such as *Staphylococcus aureus*, enterococci, Gram-negative organisms, and *Clostridium difficile* is associated with increased risk of infection. Decolonization is an evidence-based intervention that can be used to prevent health care-associated infections (HAIs). This review evaluates agents used for nasal topical decolonization, topical (e.g., skin) decolonization, oral decolonization, and selective digestive or oropharyngeal decontamination. Although the majority of studies performed to date have focused on *S. aureus* decolonization, there is increasing interest in how to apply decolonization strategies to reduce infections due to Gram-negative organisms, especially those that are multidrug resistant. Nasal topical decolonization agents reviewed include mupirocin, bacitracin, retapamulin, povidone-iodine, alcohol-based nasal antiseptic, tea tree oil, photodynamic therapy, omiganan pentahydrochloride, and lysostaphin. Mupirocin is still the gold standard agent for *S. aureus* nasal decolonization, but there is concern about mupirocin resistance, and alternative agents are needed. Of the other nasal decolonization agents, large clinical trials are still needed to evaluate the effectiveness of retapamulin, povidone-iodine, alcohol-based nasal antiseptic, tea tree oil, omiganan pentahydrochloride, and lysostaphin. Given inferior outcomes and increased risk of allergic dermatitis, the use of bacitracin-containing compounds cannot be recommended as a decolonization strategy. Topical decolonization agents reviewed included chlorhexidine gluconate (CHG), hexachlorophane, povidone-iodine, triclosan, and sodium hypochlorite. Of these, CHG is the skin decolonization agent that has the strongest evidence base, and sodium hypochlorite can also be recommended. CHG is associated with prevention of infections due to Gram-positive and Gram-negative organisms as well as *Candida*. Conversely, triclosan use is discouraged, and topical decolonization with hexachlorophane and povidone-iodine cannot be recommended at this time. There is also evidence to support use of selective digestive decontamination and selective oropharyngeal decontamination, but additional studies are needed to assess resistance to these agents, especially selection for resistance among Gram-negative organisms. The strongest evidence for decolonization is for use among surgical patients as a strategy to prevent surgical site infections.

The Human Microbiome during Bacterial Vaginosis
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Summary: Bacterial vaginosis (BV) is the most commonly reported microbiological syndrome among women of childbearing age. BV is characterized by a shift in the vaginal flora from the dominant *Lactobacillus* to a polymicrobial flora. BV has been associated with a wide array of health issues, including preterm births, pelvic inflammatory disease, increased susceptibility to HIV infection, and other chronic health problems. A number of potential microbial pathogens, singly and in combinations, have been implicated in the disease process. The list of possible agents continues to expand and includes members of a number of genera, including *Gardnerella*, *Atopobium*, *Prevotella*, *Peptostreptococcus*, *Mobiluncus*, *Sneathia*, *Leptotrichia*, *Mycoplasma*, and BV-associated bacterium 1 (BVAB1) to BVAB3. Efforts to characterize BV using epidemiological, microscopic, microbiological culture, and sequenced-based methods have all failed to reveal an etiology that can be consistently documented in all women with BV. A careful analysis of the available data suggests that what we term BV is, in fact, a set of common clinical signs and symptoms that can be provoked by a plethora of bacterial species with proinflammatory characteristics, coupled to an immune response driven by variability in host immune function.

Methodological and Clinical Aspects of the Molecular Epidemiology of *Mycobacterium tuberculosis* and Other Mycobacteria
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Summary: Molecular typing has revolutionized epidemiological studies of infectious diseases, including those of a mycobacterial etiology. With the advent of fingerprinting techniques, many traditional concepts regarding transmission, infectivity, or pathogenicity of mycobacterial bacilli have been revisited, and their conventional interpretations have been challenged. Since the mid-1990s, when the first typing methods were introduced, a plethora of other modalities have been proposed. So-called molecular epidemiology has become an essential subdiscipline of modern mycobacteriology. It serves
as a resource for understanding the key issues in the epidemiology of tuberculosis and other mycobacterial diseases. Among these issues are disclosing sources of infection, quantifying recent transmission, identifying transmission links, discerning reinfecion from relapse, tracking the geographic distribution and clonal expansion of specific strains, and exploring the genetic mechanisms underlying specific phenotypic traits, including virulence, organ tropism, transmissibility, or drug resistance. Since genotyping continues to unravel the biology of mycobacteria, it offers enormous promise in the fight against and prevention of the diseases caused by these pathogens. In this review, molecular typing methods for Mycobacterium tuberculosis and nontuberculous mycobacteria elaborated over the last 2 decades are summarized. The relevance of these methods to the epidemiological investigation, diagnosis, evolution, and control of mycobacterial diseases is discussed.

**Human Papillomavirus Laboratory Testing: the Changing Paradigm**

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Summary: High-risk human papillomaviruses (HPVs) cause essentially all cervical cancers, most anal and oropharyngeal cancers, and some vaginal, vulvar, and penile cancers. Improved understanding of the pathogenesis of infection and the availability of newer tests are changing the approach to screening and diagnosis. Molecular tests to detect DNA from the most common high-risk HPVs are FDA approved for use in conjunction with cytology in cervical cancer screening programs. More-specific tests that detect RNA from high-risk HPV types are now also available. The use of molecular tests as the primary screening tests is being adopted in some areas. Genotyping to identify HPV16 and -18 has a recommended role in triaging patients for colposcopy who are high-risk HPV positive but have normal cytology. There are currently no recommended screening methods for anal, vulvar, vaginal, penile, or oropharyngeal HPV infections. HPV testing has limited utility in patients at high risk for anal cancer, but p16 immunohistochemistry is recommended to clarify lesions in tissue biopsy specimens that show moderate dysplasia or precancer mimics. HPV testing is recommended for oropharyngeal squamous cell tumors as a prognostic indicator. Ongoing research will help to improve the content of future guidelines for screening and diagnostic testing.

**Fosfomycin**

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Summary: The treatment of bacterial infections suffers from two major problems: spread of multidrug-resistant (MDR) or extensively drug-resistant (XDR) pathogens and lack of development of new antibiotics active against such MDR and XDR bacteria. As a result, physicians have turned to older antibiotics, such as polymyxins, tetracyclines, and aminoglycosides. Lately, due to development of resistance to these agents, fosfomycin has gained attention, as it has remained active against both Gram-positive and Gram-negative MDR and XDR bacteria. New data of higher quality have become available, and several issues were clarified further. In this review, we summarize the available fosfomycin data regarding pharmacokinetic and pharmacodynamic properties, the in vitro activity against susceptible and antibiotic-resistant bacteria, mechanisms of resistance and development of resistance during treatment, synergy and antagonism with other antibiotics, clinical effectiveness, and adverse events. Issues that need to be studied further are also discussed.

**Plesiomonas shigelloides Revisited**

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Summary: After many years in the family Vibrionaceae, the genus Plesiomonas, represented by a single species, *P. shigelloides*, currently resides in the family Enterobacteriaceae, although its most appropriate phylogenetic position may yet to be determined. Common environmental reservoirs for plesiomonads include freshwater ecosystems and estuaries and inhabitants of these aquatic environs. Long suspected as being an etiologic agent of bacterial gastroenteritis, convincing evidence supporting this conclusion has accumulated over the past 2 decades in the form of a series of foodborne outbreaks solely or partially attributable to *P. shigelloides*. The prevalence of *P. shigelloides* enteritis varies considerably, with higher rates reported from Southeast Asia and Africa and lower numbers from North America and Europe. Reasons for these differences may include hygiene conditions, dietary habits, regional occupations, or other unknown factors. Other human illnesses caused by *P. shigelloides* include septicemia and central nervous system disease, eye infections, and a variety of miscellaneous ailments. For years, recognizable virulence factors potentially associated with *P. shigelloides* pathogenicity were lacking; however, several good candidates now have been reported, including a cytotoxinc hemolysin, iron acquisition systems, and lipopolysaccharide. While *P. shigelloides* is easy to identify biochemically, it is often overlooked in stool samples due to its smaller colony size or relatively low prevalence in gastrointestinal samples. However, one FDA-approved PCR-based culture-independent diagnostic test system to detect multiple enteropathogens (FilmArray) includes *P. shigelloides* on its panel. Plesiomonads produce β-lactamases but are typically susceptible to many first-line antimicrobial agents, including quinolones and carbapenems.
Update on Baylisascaris procyonis, a Highly Pathogenic Zoonotic Infection
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Summary: Baylisascaris procyonis, the raccoon roundworm, infects a wide range of vertebrate animals, including humans, in which it causes a particularly severe type of larva migrans. It is an important cause of severe neurologic disease (neural larva migrans) but also causes ocular disease (OLM; diffuse unilateral subacute neuroretinitis), visceral larva migrans (VLM), and covert/asymptomatic infections. B. procyonis is common and widespread in raccoons, and there is increasing recognition of human disease, making a clinical consideration of baylisascaris important. This review provides an update for this disease, especially its clinical relevance and diagnosis, and summarizes the clinical cases of human NLM and VLM known to date. Most diagnosed patients have been young children less than 2 years of age, although the number of older patients diagnosed in recent years has been increasing. The recent development of recombinant antigen-based serodiagnostic assays has aided greatly in the early diagnosis of this infection. Patients recovering with fewer severe sequelae have been reported in recent years, reinforcing the current recommendation that early treatment with albendazole and corticosteroids should be initiated at the earliest suspicion of baylisascaris. Considering the seriousness of this zoonotic infection, greater public and medical awareness is critical for the prevention and early treatment of human cases.

Clinical Significance and Pathogenesis of Staphylococcal Small Colony Variants in Persistent Infections
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Summary: Small colony variants (SCVs) were first described more than 100 years ago for Staphylococcus aureus and various coagulase-negative staphylococci. Two decades ago, an association between chronic staphylococcal infections and the presence of SCVs was observed. Since then, many clinical studies and observations have been published which tie recurrent, persistent staphylococcal infections, including device-associated infections, bone and tissue infections, and airway infections of cystic fibrosis patients, to this special phenotype. By their intracellular lifestyle, SCVs exhibit so-called phenotypic (or functional) resistance beyond the classical resistance mechanisms, and they can often be retrieved from therapy-refractory courses of infection. In this review, the various clinical infections where SCVs can be expected and isolated, diagnostic procedures for optimized species confirmation, and the pathogenesis of SCVs, including defined underlying molecular mechanisms and the phenotype switch phenomenon, are presented. Moreover, relevant animal models and suggested treatment regimens, as well as the requirements for future research areas, are highlighted.