

Overview and History of Universal Precautions **(Bloodborne Pathogens)**

The HIV Epidemic

In 1985, largely due to the HIV epidemic, hospital isolation practices to prevent infection in the United States were altered dramatically by the introduction of a new strategy for isolation precautions, which became known as **Universal Precautions** (UP). Following the initial reports of hospital personnel becoming infected with HIV through needle sticks and skin contamination with patients' blood, a widespread outcry created the urgent need for new isolation strategies to protect hospital personnel from Bloodborne infections. The subsequent modification of isolation precautions in some hospitals produced several major strategic changes and sacrificed some measures of protection against patient-to-patient transmission in the process of adding protection against patient-to-personnel transmission. In acknowledgment of the fact that many patients with Bloodborne infections are not recognized, the new UP approach for the first time placed emphasis on applying Blood and Body Fluid Precautions universally to all persons regardless of their presumed infection status. Until this time, most patients placed on isolation precautions were those for whom a diagnosis of an infectious disease had been made or was suspected. This provision led to the new name of Universal Precautions.

In addition to emphasizing prevention of needle stick injuries and the use of traditional barriers such as gloves and gowns, UP expanded Blood and Body Fluid Precautions to include the use of masks and eye coverings to prevent mucous membrane exposures during certain procedures and the use of individual ventilation devices when the need for resuscitation was predictable. This approach, and particularly the techniques for preventing mucous membrane exposures, was reemphasized in subsequent reports from the Centers for Disease Control (CDC) that contained recommendations for prevention of HIV transmission in healthcare settings.

In 1987, one of these reports stated that implementation of UP for all patients eliminated the need for the isolation category of Blood and Body Fluid Precautions for patients known or suspected to be infected with Bloodborne pathogens. However, the report also stated

that other category- or disease-specific isolation precautions recommended in the CDC isolation guideline should be used as necessary if infections other than Bloodborne infections were diagnosed or suspected.

The 1987 report was updated by a 1988 report that emphasized two important points: (1) blood was the single most important source of HIV, HBV, and other Bloodborne pathogens in the occupational setting, and (2) infection control efforts for preventing transmission of Bloodborne pathogens in healthcare settings must focus on preventing exposures to blood, as well as on delivery of HBV immunization. The report stated that UP applied to blood, to body fluids that had been implicated in the transmission of Bloodborne infections (semen and vaginal secretions), to body fluids from which the risk of transmission was unknown (amniotic, cerebrospinal, pericardial, peritoneal, pleural, and synovial fluids), and to any other body fluid visibly contaminated with blood, but not to feces, nasal secretions, sputum, sweat, tears, urine, or vomit unless they contained visible blood. Although HIV and HBV surface antigen had been found in some of the fluids, secretions, or excretions to which UP did not apply, epidemiologic studies in the healthcare and community settings had not implicated these substances in the transmission of HIV and HBV infections. The report noted, however, that some of the fluids, secretions, and excretions not covered under UP represented a potential source for hospital based infections or community-acquired infections, along with other pathogens. The report referred readers to the CDC isolation guideline for more information.

Body Substance Isolation

In 1987, a new system of isolation, called **Body Substance Isolation (BSI)**, was proposed after 3 years of study by infection control personnel at the Harborview Medical Center in Seattle, Washington, and the University of California at San Diego, California, as an alternative to diagnosis-driven isolation systems. BSI focused on the isolation of all moist and potentially infectious body substances (blood, feces, urine, sputum, saliva, wound drainage, and other body fluids) from all patients, regardless of their presumed infection status, primarily through the use of gloves. Personnel were instructed to put on clean gloves just before contact with mucous membranes and non-intact skin, and to wear gloves for anticipated contact with moist body substances. In addition, a "**Stop Sign Alert**" was used to instruct persons wishing to enter the room of some patients with infections

transmitted exclusively, or in part, by the airborne route to check with the floor nurse, who would determine whether a mask should be worn. Personnel were to be immune to or immunized against selected infectious diseases transmitted by airborne or droplet routes (measles, mumps, rubella, and varicella), or they were not to enter the rooms housing patients with these diseases. Other issues related to implementing BSI in a university teaching hospital were described.

Among the advantages cited for BSI were that it was a simple, easy to learn and administer system, that it avoided the assumption that individuals without known or suspected diagnoses of transmissible infectious diseases were free of risk to patients and personnel, and that only certain body fluids were associated with transmission of infections. The disadvantages of BSI included 1) the added cost of increased use of barrier equipment, particularly gloves; 2) difficulty in maintaining routine application of the protocol for all patients; 3) the uncertainty about the precautions to be taken when entering a room with a "Stop Sign Alert"; and 4) the potential for misapplication of the protocol to overprotect personnel at the expense of the patient.

In a prospective study, a combination use of gown and glove protocols similar to BSI led to lower infection rates in a pediatric intensive care unit (ICU), and, in other studies, similar combinations of barriers were associated with lower rates of infection in a pediatric Intensive Care Unit, and of resistant organisms in an acute-care hospital. However, in none of these studies, initiated before publication of BSI, were the authors attempting to evaluate BSI, nor were they able to separate the effect of gloves from that of gowns or from gloves and gowns used in combination.

Controversial aspects of Body Substance Isolation (BSI) have been summarized. BSI appeared to replace some, but not all, of the isolation precautions necessary to prevent transmission of infection. BSI did not contain adequate provisions to prevent (1) droplet transmission of serious infections in pediatric populations, including meningitis, pneumonia, and whooping cough; (2) direct or indirect contact transmission of epidemiologically important microorganisms from dry skin or environmental sources; or, (3) true airborne transmission of infections transmitted over long distances by floating droplets. Although BSI emphasized that a private room was indicated for some patients with some diseases transmitted exclusively, or in part, by the true airborne route, it did not

emphasize the need for special ventilation for patients known or suspected of having pulmonary tuberculosis or other diseases transmitted by airborne droplet nuclei. The lack of emphasis on special ventilation was of particular concern to CDC in the early 1990's because of drug-resistant tuberculosis.

BSI and UP shared many similar features designed to prevent the transmission of Bloodborne pathogens in hospitals. However, there was an important difference in the recommendation for glove use and hand-washing. Under UP, gloves were recommended for anticipated contact with blood and specified body fluids, and hands were to be washed immediately after gloves were removed. Under BSI, gloves were recommended for anticipated contact with any moist body substance, but hand-washing after glove removal was not required unless the hands visibly were soiled. The lack of emphasis on hand-washing after glove removal was cited as one of the theoretical disadvantages of BSI. Using gloves as a protective substitute for hand-washing may have provided a false sense of security, resulted in less hand washing, increased the risk of hospital-based transmission of pathogens, because hands can become contaminated even when gloves are used, and are contaminated easily in the process of removing gloves, and contributed to skin problems and allergies associated with the use of gloves. On the other hand, proponents of BSI have noted that studies of hand washing have indicated that there is relatively low compliance by hospital personnel, that glove use may have been easier to manage than hand washing, and that frequent hand washing may have led to eczema, skin cracking, or, in some persons, clinical damage to the skin of the hands. Although use of gloves may have been better than no hand washing, the efficacy of using gloves as a substitute for hand washing has not been demonstrated.

OSHA Bloodborne Pathogens Regulations

In 1989, the Occupational Safety and Health Administration (OSHA) published a proposed rule regarding occupational exposure to Bloodborne pathogens in hospitals and other healthcare settings. The proposed rule, based on the concept of UP, raised concerns within the infection control community. Among them were concerns about the use of "visibly bloody" as a marker for the infectious risk of certain body fluids and substances, the imbalance toward precautions to protect personnel and away from protection for patients, the lack of proven efficacy of UP, and the costs for implementing the proposed regulations.

After a series of OSHA public hearings and the review of written comments, the proposed rule was modified, and the final rule on occupational exposure to Bloodborne pathogens was published in 1991. Although the final rule was expected to improve occupational safety in the care of patients infected with Bloodborne pathogens, its impact on the cost of patient care and on hospital infection rates and control has remained undefined. Information on complying with the OSHA final rule has been made available by the American Hospital Association and others.

The Need for a New Isolation Guideline

By the early 1990s, isolation had become an infection control dilemma. Although many hospitals had incorporated all or portions of UP into their category - or disease-specific isolation system and others had adopted all or portions of BSI, there was much local variation in the interpretation and use of UP and BSI, and a variety of combinations was common. Further, there was considerable confusion about which body fluids or substances required precautions under UP and BSI. Many hospitals espousing UP really were using BSI and vice versa. Moreover, there was still no agreement about the importance of hand washing when gloves were used, and the need for additional precautions beyond BSI to prevent airborne, droplet, and contact transmission. Some hospitals had not implemented appropriate guidelines for preventing transmission of tuberculosis, including multidrug resistant tuberculosis. As other multidrug - resistant microorganisms were emerging, some hospitals failed to recognize them as new problems and to add appropriate precautions that would contain them.

In view of these problems and concerns, no simple adjustment to any of the existing approaches -- UP BSI, the CDC isolation guideline, or other isolation systems -- appeared likely to solve the dilemma. Clearly what was needed was a new synthesis of the various systems that would provide a guideline with logistically feasible recommendations for preventing the many infections that occur in hospitals through diverse modes of transmission. To achieve this, the new guideline would (1) have to be epidemiologically sound; (2) have to recognize the importance of all body fluids, secretions, and excretions in the transmission of hospital based pathogens; (3) have to contain adequate precautions for infections transmitted by the airborne, droplet, and contact routes of transmission; (4) have

to be as simple and user friendly as possible; and, (5) have to use new terms to avoid confusion with existing systems.

Based on these considerations, this guideline subsequently was developed. It contains three important changes from previous recommendations. First, it synthesizes the major features of **Universal Precautions** and **Body Substance Isolation** into a single set of precautions to be used for the care of all patients in hospitals regardless of their presumed infection status. These precautions, called **Standard Precautions**, are designed to reduce the risk of transmission of Bloodborne and other pathogens in hospitals. As a result of this synthesis, a large number of patients with diseases or conditions that previously required category- or disease-specific precautions in the 1983 CDC isolation guideline are now covered under **Standard Precautions** and do not require additional precautions. Second, it collapses the old categories of isolation precautions (Strict Isolation, Contact Isolation, Respiratory Isolation, Tuberculosis Isolation, Enteric Precautions, and Drainage/Secretion Precautions) and the old disease- specific precautions into three sets of precautions based on routes of transmission for a smaller number of specified patients known or suspected to be infected or colonized with highly transmissible or epidemiologically important pathogens. These Transmission-Based Precautions, designed to reduce the risk of airborne, droplet, and contact transmission in hospitals, are to be used in addition to Standard Precautions. Third, it lists specific syndromes in both adult and pediatric patients that are highly suspicious for infection and identifies appropriate Transmission-Based Precautions to use on a practical, temporary basis until a diagnosis can be made. These temporary precautions also are designed to be used in addition to **Standard Precautions**.

In summary, the new guideline is another step in the evolution of isolation practices in US hospitals. It now is recommended for review and use by hospitals with the following provision. No guideline can address all of the needs of the more than 6,000 US hospitals, which range in size from five beds to more than 1,500 beds and serve very different patient populations. Hospitals are encouraged to review the recommendations and to modify them according to what is possible, practical, and prudent.