Department of Infection Control

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Research Activities

Epidemiological research on sexually-transmitted infections

From 2003 through 2008, a study group of the Ministry of Health, Labor and Welfare on sexually-transmitted infections was active with Dr. Onodera as the chief investigator. The main objectives of this study group were to perform research to develop methods of preventing the onset and spread of sexually transmitted infections and to promote countermeasures against them. The main study items were: 1) epidemiological research on trends in the onset of sexually transmitted infections, 2) early detection of sexually transmitted infections in young people and trials related to treatment, 3) development of rapid and highly precise testing methods for genital herpes and genital warts, and 4) surveillance of drug-resistant gonococcus and the development of diagnostic and therapeutic methods for gonococcal infections of the throat. Starting in 2009, a new study group, "Study group on development of a system for prevention and treatment of sexually-transmitted infections" was established on the basis of a 3-year plan. The new group undertook further investigations of the same items as in the previous study group. New research starting this year included studies of the establishment of syphilis notification criteria, a behavioral background survey on the diversity of sexual behavior, and a microbiological analysis of the pathogens of sexually-transmitted infections.

According to a survey of trends in the onset of sexually transmitted infections, decreases in the rates of sexually-transmitted chlamydia infections and gonococcal infections have been observed in both men and women in Japan since 2003, but the prevalence of genital herpes and genital warts remains about the same or only slightly decreased in both men and women. A survey of all sexually transmitted infections was performed in model prefectures as an epidemiological survey to verify the fixed-point surveys. Chiba, Ishikawa, Gifu, and Hyogo prefectures were asked to cooperate in the survey for 4 years starting in 2006, and Iwate, Ibaragi, and Tokushima prefectures were asked to cooperate for 3 years starting in 2007. As a result, the analysis was performed only for medical institutions surveyed for 3 consecutive years, but no major differences from all-case reports and trends in the past were found. In all 7 prefectures, monotone decreases were seen in the onset trends survey of gonococcal infections and genital herpes, but in all-case surveillance continued for 3 years, clear decreases were seen, except for male genital herpes.

Self-testing kits for chlamydia infections (polymerase chain reaction method) continued to be distributed by post to young people, but the positivity rates for sexual chlamydia infections did not exceed 3% this year. Reponses to a sexual behavior questionnaire clearly showed the necessity of improvements in medical institutions to eliminate anxiety and doubts among persons with positive test results.

These results suggest it is necessary to establish specific definite standards and surveillance design for fixed-point surveys in the future. The government must maintain good relations with non-governmental organizations and medical institutions to maintain the test and medical examinations to diagnose sexually-transmitted infection in young people.

Pandemic influenza in Jikei University Hospital and Social Welfare Facilities

A study was performed of 954 patients with pandemic influenza diagnosed and treated in The Jikei University Hospital from May through December 2009. Anti-influenza therapy was started within 2 days after onset in 94% of patients. All cases were alleviated, and no deaths occurred. Many severely ill patients were those younger than 9 years or older than 60 years, those with underlying diseases, and those in whom the interval between onset and diagnosis was more than 6 days. These results in our University Hospital suggested that early diagnosis and treatment of influenza are essential.

In 3 social welfare facilities where we provided guidance on infection control, we investigated whether our countermeasures for infection control suppressed the spread of influenza. Employees were prohibited to work for 3 days when their family members contracted pandemic influenza. When influenza broke out in the facilities, we discussed with physicians whether persons contacted closely with the patients needed to take preventive medications. Preventive medicine against pandemic influenza was administered after consent was obtained from family members. We could prevent influenza brought into the facilities. And the spread of the infection was suppressed when persons who have contracted pandemic influenza in the facilities was left the facilities.

Clinical characteristics and treatment of urosepsis

Forty-five patients with urosepsis were examined at the Kanagawa Prefecture Shiomidai Hospital. More than 80% of the patients were elderly or had underlying diseases. The efficacy rate of early treatment was 48.9%, and the causes of treatment failure included inappropriate doses and an insufficient number of treatments with antibacterial agents. Three patients died, and early treatment was ineffective in all of them. It is important to administer adequate doses of antibacterial agents in an appropriate dosage regimen in the early treatment of urosepsis.

Toxoplasma encephalitis in patients without human immunodeficiency virus (HIV) infection

The incidence of toxoplasma encephalitis, a characteristic disease of acquired immunodeficiency syndrome (AIDS), has recently increased in patients with AIDS. However, toxoplasma encephalitis also occurs in patients without AIDS, including those who have malignant tumors, have received transplants, and have received immunosuppressants. We investigated toxoplasma encephalitis in patients without AIDS (patients we treated and patients reported on in the literature). Although toxoplasma encephalitis is rare, it must be considered, even in the absence of HIV infection, when multiple intracranial lesions and associated focal symptoms are present in patients who have

underlying diseases, because toxoplasma encephalitis can occur in severely immunodeficient patients.

Basic study of clinical isolates of Pseudomonas aeruginosa (P. aeruginosa)
Minimum inhibitory concentrations (MICs) of 5 carbapenems were measured in 384 strains of *P. aeruginosa* isolated and identified from 282 patients. Among the 384 strains, 11 were multiple drug-resistant strains, and 8 of them produced metallo-beta lactamase. The results of measurement of MIC showed potent antibacterial activity in the order of doripenem, meropenem, biapenem, imipenem, and panipenem. The MIC required to inhibit the growth of 50% of organisms differed by 2- to 16-fold, and the MIC required to inhibit the growth of 90% of organisms differed by 2- to 4-fold. Strains of imipenem-resistant *P. aeruginosa* ($\geq 16\,\mu$g/ml) were isolated at high rates from drains, tubes, catheters, bile, feces, sputum, and catheter urine. *P. aeruginosa* was isolated with high rates in Departments of Rheumatology, Cardiac Surgery, Oncology and Hematology, Neurosurgery, Gastroenterology, Cardiology, and Vascular Surgery.

Biofilms of clinically isolated staphylococci
Staphylococci form biofilms on the surfaces of medical devices, such as vascular indwelling catheters and artificial joints, and lead to chronic infections. Analysis of biofilms formed by clinical isolates of staphylococci is necessary to establish methods for preventing and treating biofilm infections. Since staphylococci in liquid culture media could form biofilms on polystyrene surfaces *in vitro*, we examined the rate of biofilm formation in staphylococcus isolated in Jikei University Hospital. Biofilms were formed in 29.2% of methicillin-sensitive *Staphylococcus aureus* strains (7 of 24 strains), 29.2% of methicillin-resistant *S. aureus* strains (7 of 24 strains), and 25.0% of *S. epidermidis* strains (7 of 28 strains). Biofilms formed by each staphylococcus had different degradation profile by polysaccharide-degrading enzymes, proteolytic enzymes, and/or DNase. These results suggest that biofilms are formed by polysaccharides, proteins, or extracellular DNA. Specially, since biofilms formed by 4 of the 7 clinically isolated strains of *Staphylococcus epidermidis* could be degraded by polysaccharide-degrading enzymes, polysacchalides should be included in the biofilms.

Publications

Yoshikawa K, Onodera S. The examinations of infectious disease using urine specimen-urinary antigen, urinary bacterial examination (in Japanese). *Sogo Rinsho* 2009; **58:** 1246–50.