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LIQUIDATION AND REDUCTION OF INFECTIOUS DISEASES

Translation No. 1409

JUNE 1965

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DISINFECTION AND ITS ROLE IN THE SYSTEM OF MEASURES FOR THE
LIQUIDATION AND REDUCTION OF INFECTIOUS DISEASES

[Following is the translation of an article by V. I. Vashkov, published in the Russian-language periodical Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Journal of Microbiology, Epidemiology and Immunobiology), #8, 1964, pages 3-7. Translation performed by Sp/7 Charles T. Ostertag Jr.]

Disinfection plays a great role in the medical-epidemiological service of the USSR. Specialized establishments - disinfection stations - have been created in 56 large cities. Almost every medical-epidemiological station has a disinfection section, and in a large number of them -- a prophylactic disinfection division. The number of workers in the field of disinfection reaches 50,000 men.

The main types of activity for the disinfection establishments are the complete and timely hospitalization of persons with infectious diseases and the simultaneous organization and carrying out of disinfection of foci, and also prophylactic disinfection, including disinfection, disinfestation and rat extermination. According to the new stand "Concerning state sanitary supervision in the USSR" (approved by the USSR Council of Ministers on 29 October 1963, No. 1107), the head medical doctor has the right to demand the compulsory disinfection of accommodations and objects used by the patient and representing a danger for the spreading of infection. Disinfection measures, carried out in foci and with a prophylactic aim, will lead to the reduction in the number of infectious diseases in the populated point.

The structure of the disinfection stations and the work carried out by them in the majority of cases are the same. Nevertheless, in the work of individual disinfection stations there are peculiarities which merit popularization.

Thus, for example, the work of the Leningrad Disinfection Station is essentially different in content. In it, along with hospitalization and conclusive disinfection with room disinfection, attention is centered on the registration and following up of patients with infectious diseases, statistical processing of materials, and a warning system in the regional medical-epidemiological stations concerning foci of infection that have sprung up. This gives a station a common center in a city that receives warnings concerning the appearance of infectious diseases from the entire medical-prophylactic network.

After hearing the account of the Leningrad Disinfection Station, the Staff of the Ministry of Public Health of the RSFSR decided to popularize the experience of its operation.

Such an operation is valuable due to the fact that it makes it possible to considerably reduce the time for liquidating a focus of infection and ensures a complete and accurate recording of infectious diseases, an active operational bond both with medical-prophylactic and medical-epidemiological establishments and the carrying out of the necessary antiepidemic measures in the shortest time.

The disinfection stations of Alma-Ata and Sochi are organizing a routine disinfection with their forces. This is different from other stations (Moscow, Dushanbe, Kharkov), where this function rests with the medical-prophylactic network or with workers of the medical-epidemiological stations. The Alma-Ata and Sochi Disinfection Stations are proving the expediency of the system introduced by them by the fact that with it all the work in a focus turns out to be tied together closely. For the organization of routine disinfection into apartment foci, the Alma-Ata Disinfection Station set aside a doctor and four advisers who were ensured of transportation for their trips. The adviser furnishes the means for disinfection, explains the measures for the prevention of spreading of the infection in the focus and beyond its limits, and leaves instructions on the sequence for carrying out the routine disinfection. In the ensuing 3-7 days (depending on the duration of the disease) the adviser checks for correctness in carrying out the routine disinfection.

In order to evaluate the experience of the Alma-Ata Disinfection Station, it is necessary to organize such a system in other cities that have disinfection stations. But apparently such an organization of routine disinfection has a number of advantages compared to Order No. 321 recommended by the minister.

Routine disinfection is a very effective antiepidemic measure if it is conducted timely (as far as isolation of the infectious material from the organism of the patient) and thoroughly. This may be guaranteed in the event that those who are taking care of the patient conduct it, and in certain cases the patient himself. With a well set up routine disinfection the necessity of conducting a conclusive disinfection is eliminated.

In the area of disinfection just as in other areas of medical science, major research operations are carried out by scientific research establishments in conjunction with practical workers. The main operations are: Study of the antiepidemic value of disinfection measures; the

search for new means for the destruction of pathogenic microorganisms, harmful arthropods and rodents, and the study of the mechanism of action on them; the study of preparations that attract and scare away arthropods and rodents; the development of new methods and search for new means of sterilization; the development of equipment necessary for carrying out sterilization, disinfection, disinfestation and rat extermination.

It is necessary to stress that the effectiveness of disinfection and other antiepidemic measures must be evaluated by their influence on the emergence or spreading of this or that disease. From such a point of view, an evaluation is being conducted in a number of places on the effectiveness of disinfection during typhoid, dysentery and several other infectious diseases.

Thus, in 1962 the workers of the Central Scientific-Research Disinfection Institute together with the workers of the Ashkhabad Medical-Epidemiological Station showed that typhoid morbidity was lowered considerably if a complex of medical-hygienic and disinfection measures were carried out, including a well regulated prophylactic disinfection of drinking water, a thorough cleaning up of inhabited places, timely and complete hospitalization and thorough disinfection in foci of infection, extensive fly extermination operations, the exposure of bacteria carriers and the routine disinfection of chronic bacteria carriers and convalescents.

Great attention is being given to the study of the antiepidemic effectiveness of conclusive disinfection for dysentery in Kiev, Dnepropetrovsk, Kharkov, Moscow, Leningrad and other cities. In these cases, in one half of the city the usual conclusive disinfection is conducted and in the other half it is not. Then a comparison is made of the dysentery morbidity in both halves. As a result of such a test set up, sometimes contradictory results are obtained: With some investigators the conclusive disinfection did not exert an influence, and in others it caused a lowering of dysentery morbidity. This testifies to the fact that the conclusive disinfection during dysentery was conducted without regards to quality. In order to make final conclusions it is necessary to conduct conclusive disinfection in strict accordance with instructions. Only under such conditions is it possible to make a comparison of morbidity in various parts of the city. What has been stated is in regards to conclusive disinfection conducted in apartment foci. As regards boarding houses, children's institutions, etc., then the available material testifies to the high antiepidemic effectiveness of disinfection measures. In our opinion the main mission of the stated investigations should be not so much the abolishment of conclusive disinfection as the development of those methods of disinfection which would exert a positive influence on the reduction of dysentery morbidity.

It is known that in the transmission of the causative agents of enteric infections great epidemiological significance is assigned to "dirty" hands, but up until recently there wasn't an effective means for their disinfection. At the present time, with the aim of disinfection of

the hands, on the proposal of the Central Disinfection Institute the soap "Gigiyena" is being produced. It contains hexachlorophene; by using it frequently the skin on the hands is freed from pathogenic microorganisms and besides this it acquires bactericidal properties. When used for washing the body this soap reduces the odor of perspiration. Toilet soap, containing hexachlorophene, should be widely popularized for workers in food enterprises, children's establishments, etc., where up until now for the disinfection of hands they recommend bleaching powder and chloramine, which the workers avoid using.

There is great prophylactic significance in disinfection during tuberculosis, meanwhile up until recently practice has not been disposed with good means. At the present time the Central Disinfection Institute has recommended two highly effective substances to industry for production -- hexylresorcinol and 1-chlorine-2-naphthol. Hexylresorcinol, which earlier was used as an antihelminthic, is highly effective even in cases when it is used for disinfection during tuberculosis. The second preparation is original and was not used earlier. Each of these is approximately 5-10 times more effective than chloramine which is used for the corresponding purposes. However, both preparations are still not being produced commercially, though a test group of them has been put out.

The wide distribution of epidemic hepatitis requires the urgent participation of the disinfection service in the struggle with it. As is known, this infection is maintained at a high level throughout the entire world. In as much as a number of authors explain this circumstance by the fact that in the spreading of hepatitis a major role is played by the parenteral route of contamination (hyperdermic hepatitis), the disinfection establishments should not only study the effectiveness of disinfection measures during this infection but also organize the sterilization of instruments used by medical establishments for the parenteral administration of various types of preparations. Such a beginning has already been proposed for operation. In Kishinev the Central Laboratory (Municipal) for the Sterilization of Hyperdermic Syringes has been organized. It services part of the medical establishments of the city. However, as experience has shown, the organization of general city laboratories for sterilization is not expedient. It is better to create sterilization departments in the hospitals which would not only accommodate the hospital with sterile instruments, but also sections attached to it. Adjusting of sterilization and control over how correctly it is carried out should be entrusted to the disinfection service.

Morbidity with epidemic conjunctivitis inflicts sharp damage to the health of residents in the republics of Central Asia, particularly the residents of Turkmenia. A major role in the transmission of the causative agent of this disease (Koch-Weeks bacillus) is played by the market fly (Musca sorbens). The house fly (Musca domestica vicina) takes a certain part in the transmission of the causative agent. In Turkmenia the medical-

epidemiological stations of Nebit-Daga, Mara, Krasnovodsk, and Kuli-mayak, under the leadership of the Central Disinfection Institute attained a sharp reduction in morbidity by means of destroying the carrier, however, its level still remains quite high and further searches are necessary for methods of reducing morbidity with epidemic conjunctivitis.

In a number of places in the Soviet Union, hemorrhagic fever morbidity of a diverse etiology is observed. Field and forest rodents serve as the reservoir for the causative agents. The necessity arises for the development of a complex of measures, including measures for preventing the penetration of field rodents into populated points. The medical-epidemiological stations of the Tulsкая and Vladimirskaya Oblasts under the supervision of workers from the Central Disinfection Institute have developed a complex of such measures. Part of it consists of the creation, in the fall, of a belt 50 meters in width (barrier) around the populated point. It is fitted out with poisoned bait. Such an operation merits attention, however, one should not forget the field animals and birds which may suffer because of this.

With the aim of destroying field rodents, in particular water voles at sites that are unsafe in respect to tularemia, the possibility is being studied of using systemic poisons (METHYL MERKAPTOPHOS, AKTAMETHYLTETRAMIDE of pyrophosphoric acid). [Translator's note. Here and in the subsequent treatment of chemicals and preparations, block letters indicate that the word has not been precisely established and that it is either a transliteration from the Russian or has been translated syllable by syllable.]

Methods have been developed which make it possible to destroy rodents and their ectoparasites simultaneously. This is achieved by using such preparations as PIVALYLINDANDION, heptachlor, etc., which exert a simultaneous rodenticide and insecticide action, or mixtures of rodenticides with insecticides, such as DDT, aldrin, dieldrin, etc. with zinc phosphide, ETHYLENE FLUOROHYDRIN, DIPTORAN, etc. Upon eating bait containing systemic preparations, the blood of rodents acquires toxic properties for arthropods. Such methods have been developed for the prophylaxis of plague, tick-borne encephalitis and cutaneous leishmaniasis. It must be expected that such methods will be used for the prophylaxis of hemorrhagic fever and tick-borne rickettsial diseases, tularemia and other infections.

We will not dwell on other infections, where in the complex of anti-epidemic measures disinfection also exerts a positive influence on the lowering of morbidity.

Switching to a presentation of some data in respect to new means and methods used for the purpose of disinfection, it is necessary first of all to point out that in a number of places in the Soviet Union, and also in the Central Disinfection Institute, research is being conducted that is devoted to the feasibility of creating cotton fabrics possessing bacteri-

cidal properties. Such a fabric is obtained by means of combining the bactericide with the fiber thread or wadding, as a result of which the fabric acquires bactericidal properties. Most active are fabrics containing silver. The field of application of biologically active fiber is extensive, but mainly these are dressings: Bandages, gauze, tampons, wadding, leukoplasters, surgical thread for sewing wounds, etc.

Besides the substances mentioned above, a number of highly effective bactericides have been studied and have been recommended to industry for production. These are: Hexachlorophene ($C_{13}H_6Cl_6O_2$) [apparently should be Cl_6], DICHLOROHYDANTOIN ($C_3H_2O_2N_2Cl_3$), DICHLOROMETHYLHYDANTOIN ($C_5H_6N_2O_2Cl_2$), Monosodium salt of DICHLORO ISOCYANURIC ACID ($C_3NaCl_2N_3O_3$), TRICHLORO ISOCYANURIC ACID ($C_3Cl_3N_3O_3$), BENZYLCHLOROPHENOL (C_3H_7ClO), BETA-PROPYLOLACTONE ($C_3H_4O_2$), PHENYLTRICHLOROACETATE ($C_6H_5OCOCCL_3$), and CATIONATE S-SO, etc.

The high sensitivity of luminescent microscopy was used for determining live and dead spores of microorganisms which had perished following the influence of disinfecting sporicides. By utilizing auramine as a fluorochrome, it is possible with the help of a fluorescent microscope to rapidly reveal the presence of sporicidal properties in any substance. The feasibility of the rapid visual detection of sporicidal properties in disinfecting substances, based on luminescent metachromasia, merits attention as an express method for appraising the activity of preparations.

In recent years significant changes have also taken place in the area of rodent control. In a number of cities the disinfection service has reached the level of freeing 70% of the area of rodents. New preparations, related to anticoagulants, have been proposed which are different from previous ones in their mechanism of action: ZOOKUMARIN ($C_{13}H_{16}O_4$), RATINDAN ($C_{23}H_{11}O_3$), PIVALYL DANDION ($C_{14}H_{14}O_3$) and others. The investigation of organic fluorine compounds has shown that in this group there are preparations possessing good pesticide properties: This group includes DIFTORAN (n,n' - di (β -FLUORINE ETHOXYSENYL) DIMETHYL METHANE -- $C_{19}H_{22}O_2F_2$), FLURO ACETAMIDE ($CH_2FCO NH_2$), MONOFTORIN, and others.

The effectiveness of disinfecting substances also depends on the efficiency of the equipment. It is necessary to note that our industry is assimilating new equipment very slowly. In 1964 the preparation should begin of a plunger hand sprayer, the production of which the disinfection service has been striving for a period of four or five years. Production will also begin on a modernized hand insecticide sprayer. In 1964 industry was pledged to produce test models of sprayers on a motoroller for cities and dusters and sprayers on a motorcycle for rural areas. This year industry has promised enough hand dusters and sprayers to satisfy the needs of the medical-epidemiological service. Output has begun of chambers (stationary and on a trailer) with volumes of $1.8 m^3$ and $3 m^3$.

In spite of the deficiencies in outfitting the disinfection service with equipment and preparations, we have the full possibility, by combining modern means of disinfection, insect extermination and rodent control with hygienic measures, to exert an active influence on the further reduction of some and the liquidation of other infectious diseases.