

Maine State Library  
**Digital Maine**

---

Health & Human Services Documents

Health & Human Services

---

2-1-1960

## Epidemiology of Hospital Centered Infections

Maine Department of Health and Welfare

Alta Ashley

*Maine Department of Health and Welfare*

Follow this and additional works at: [https://digitalmaine.com/dhhs\\_docs](https://digitalmaine.com/dhhs_docs)

---

### Recommended Citation

Maine Department of Health and Welfare and Ashley, Alta, "Epidemiology of Hospital Centered Infections" (1960). *Health & Human Services Documents*. 30.

[https://digitalmaine.com/dhhs\\_docs/30](https://digitalmaine.com/dhhs_docs/30)

This Text is brought to you for free and open access by the Health & Human Services at Digital Maine. It has been accepted for inclusion in Health & Human Services Documents by an authorized administrator of Digital Maine. For more information, please contact [statedocs@maine.gov](mailto:statedocs@maine.gov).



DEAN H. FISHER, M.D.  
COMMISSIONER

*Reprinted from the February 1960 issue of  
The Journal of The Maine Medical Association*

State Of Maine

## Department of Health and Welfare

# Epidemiology Of Hospital Centered Infections

ALTA ASHLEY, M.D., M.P.H.\*

The modern hospital serves a varied role; a place of healing for the sick and maimed, workshop for physicians, research laboratory for the study of diseases and their cures, and as a health education center for the professional staff, physician, patients and general public. A century ago, the hospital was little more than a place to die. Death was frequent and it mattered little whether it was from the original affliction or from infection acquired within the hospital.

For the past few years it has become evident that even in the best modern hospital, acquired infection is not unknown. This is especially true with regards to nursery infections and post-operative and post-partum staphylococcal infections. Such hospital centered infections are unfortunate, expensive, often tragic; and are in the most part preventable. Every means possible must be used to prevent them.

The control of hospital centered infections requires unrelenting effort on the part of all persons involved with the care and comfort of the hospitalized individual. An understanding of epidemiologic factors relative to spread of disease is desirable in formulating procedures for the control of (hospital centered) infection.

Infection is the result of the interaction of three factors; virulence of the organism, the resistance of the host, and the size of the inoculum. Two other factors to be considered in hospital centered infections are the reservoir (infected persons brought into the milieu) and vectors or transmitting agents (insects, healthy carriers, infected food, and contaminated inanimate objects). Whatever modifies the interplay of these factors affects the outcome e.g. tends to suppress the rate of infection. The modes of spread (vehicles), the susceptibility of the organism to changes in the environment, the age, sex, and distribution of the host and reservoir and location and type of infection determine the methods of control.

The portal of exit of an infecting agent is one of the most important factors in determining its ease of spread.

Most agents use but one portal of exit. If there are two one is definitely subordinate to the other. e.g. poliomyelitis (fecal over respiratory) smallpox (respiratory over skin lesions). Infectious diseases to which human infection is a blind alley, e.g. trichinosis, malaria, tetanus, need no isolation techniques to control spread; diseases contracted through venereal contact almost exclusively can be handled easily in open wards. Respiratory spread is constant, spread through fecal contamination is intermittent, not only because defecation is intermittent but actual excretion of organisms into the fecal contents is also intermittent in some diseases, for example in the typhoid-dysentery group.

Susceptibility of the organism to changes in environment plays a large role in disease control. The spread of organisms which are susceptible to drying can be retarded by controlling the immediate environment of the patient through gowning, masking and handwashing. Those organisms which resist drying or high temperatures such as spore formers, the virus of serum hepatitis, and the staphylococcus, require much more rigid control of the air, clothing and equipment to prevent their spread.

The staphylococcus, which may be excreted by the respiratory tract, the skin, in the feces; or carried without infection in the nose, throat, on clothing and skin; resists changes in environment — drying, short periods of heat, chemicals (chemotherapeutic agents) and taxes man's ingenuity to develop measures of control.

The modern hospital is by its very nature an excellent example of the interplay of these factors. The very young, the very old, the maimed and debilitated make up a large part of hospital population. They are also the group which is most highly susceptible to infection, and which are most in need of hospital care. Infections which have failed to respond to home care are also found in hospitals! The causative organisms have already acquired, to a large degree, resistance to many antibiotics. Thus, within most hospital walls are congregated many sources of infection and a group of persons highly susceptible to those infections.

\*District Health Officer.

Hospital centered staphylococcal infection is a prime example of the effect of drugs on an infecting organism. The widespread use of antibiotics both within the hospital and in the community at large has apparently destroyed the balance between saprophytic and pathogenic organisms so that drug-resistant pathogenic organisms have increased to levels enabling them to infect apparently healthy hosts. Means of attack are to try to restore the saprophytic-pathogenic balance through the regulation and limitation of drug therapy, to find an effective agent to destroy the organism in the environment, and to improve isolation techniques.

Diseases such as smallpox, typhoid, diphtheria and polio in which effective active immunization is available are best controlled by diminishing the susceptibility of the host through prophylactic immunization. Immunity against such diseases among hospital staffs should be kept at as high levels as possible through periodic inoculations. The use of influenza vaccine in season is also recommended.

Susceptibility of exposed individuals can be reduced also through passive immunization produced by means of gamma globulin in such diseases as infectious hepatitis, measles and german measles; by diphtheria antitoxin and by hyper-immune pertussis serum when indicated.

Staff members at risk regarding tuberculosis should be protected by constant vigilance through skin testing and roentgen chest examination. Under certain circumstances, the use of BCG may be considered as a means of protection.

The danger of outbreaks of common contagious diseases can be minimized in pediatric departments by careful admission histories as to possible prior exposure, immunization and contagious disease experience of all children admitted; isolation of those with fever of undetermined origin; use of passive immunizing agents in exposed susceptibles; and discharge of susceptible patients who can be safely discharged before onset of communicable state, and isolation of those not able to be discharged.

Isolation techniques are means by which we try to reduce the spread of disease through controlling the environment, including the vehicles of spread (flies, fomites, foods, and healthy carriers).

Enteric diseases are spread in large part through fecal contamination of the environment although enteroviruses may also be isolated early from throat washings. The excreta, then, must be handled with care; enema cans, bedpans, etc. must be sterilized; personal linen and bedding must be regarded as contaminated; and all unused foods, drink, and objects handled by the patient destroyed or cleansed. Persons working about such a patient should be gowned, and great care must be taken as to hand washing when leaving the room. Isolation in separate quarters is desirable for such patients and especial attention paid to fly control. Persons coming in direct contact with cases of enteric disease, such as

salmonellosis and shigellosis must have their urine and stools cultured in order to be sure infection has not taken place during the time of exposure.

In the control of diseases spread by droplet infection without evidence of spread through fecal contamination, the point of attack is the reduction of droplet contamination of the air breathed by contacts through masking, ultra-violet irradiation of the air, air conditioning, chemical prophylaxis, and care in disposal of material soiled by sputum. Frequent examination and culture of the nose and throat of attendants is most important when colonization of healthy persons occur, as in staphylococcal, streptococcal or diphtheritic infections.

Constant watch for evidence of infection must be maintained, particularly in post-operative and post-partum patients, newborns and infants. Diarrhea or a sudden rise or drop in temperature in a newborn are signs of impending danger from infection for which a source should be sought and from which other members of the nursery should be protected by strict isolation techniques. Development of skin lesions, however insignificant, among these patients and their associates, is an indication of a possible staphylococcal outbreak within the hospital or ward.

The spread of infection from the hospital to the community is an ever present problem. When patients who have entered a hospital with infection or who have acquired infection while hospitalized are discharged with infection still present, the family should be instructed in proper techniques for handling such patients and in the need for release cultures, if such are required by the Rules and Regulations of the Bureau of Health.

Staphylococcal infection poses a particular problem in this regard. Often, hospital discharge occurs during the incubation period or the patient develops inapparent infection which none-the-less renders him a source of infection to others. This is particularly true of post-partum patients and newborns. When a staphylococcal problem is known to exist in a hospital, follow-up of discharged patients should be done either by telephone or through public health nursing services.

If recently discharged patients are readmitted because of staphylococcal infections, it is apparent that a hospital-centered problem exists. Diligent search for the source of infection must be made and appropriate means of combatting the infection instituted.

It is the legal responsibility of the administrator of a hospital to report to the Local Health Officer or to the Bureau of Health all cases of reportable diseases. Occurrence of any unusual communicable disease or any outbreak should be reported immediately to the Bureau of Health. This is a most important step in the finding of sources of such infections, which may be unrecognized in a community, particularly one remote from the hospital.

With proper attention to means of infection control the modern hospital need not fear that it will return to play the role of pest house or become a source of infection for its patients, staff or the community.