A Study of the Application of Laminar Flow Ventilation to Operating Rooms

A study of airflow patterns and levels of airborne contamination at various critical sites in a simulated operating room equipped with a horizontal unidirectional airflow system revealed a dependence upon the location of personnel and equipment in the airstream. Conventional air sampling techniques were used to recover the chemical and biological contaminants. The study was conducted in three stages to determine (*a*) the effect of static manikins on the distribution of uranine dye aerosols during simulated surgical procedures, (*b*) the effect of human volunteers on the distribution of viable micro-organisms during simulated surgical procedures, and (*c*) the distribution of viable micro-organisms by a normal surgical team during actual surgical procedures on normal animals. Two configurations of people and equipment, one typical of routine neurosurgery and one typical of routine cardiac surgery, were established and orientated both perpendicular and parallel to the direction of the airflow.

These techniques showed that laminar airflow used in an operating room can yield mean levels of viable airborne contamination at critical sites as low as 0.05 organisms per cubic foot of air. This level compares with five or more organisms per cubic foot of air for operating rooms ventilated by more conventional means. This low level of 0.05 organisms per cubic foot of air was reached without altering any of the normal techniques of the surgical team.

Public Health Monograph No. 78

A Study of the Application of Laminar Flow Ventilation to Operating Rooms. *By Donald G. Fox, Ph.D.* Public Health Monograph No. 78 (PHS Publication No. 1894), 58 pages. U.S. Government Printing Office, Washington, D.C., 1969, 70 cents.

The accompanying article summarizes the contents of Public Health Monograph No. 78. Dr. Fox is currently on detail to the Planetary Quarantine Program, Bioscience Programs, Office of Space Science and Applications, National Aeronautics and Space Administration. At the time this study was prepared, he was chief, Hospital Unit, Environmental Services Branch, Division of Research Services, National Institutes of Health.

Readers wishing to read the full monograph may purchase copies from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Official agencies and others directly concerned may obtain single copies from the Public Inquiries Branch, Office of Information and Publications, Public Health Service, Washington, D.C. 20201. Copies also will be found in the libraries of professional schools and major universities and in selected libraries.

Results of these studies revealed that in the neurosurgery configuration the minimum airborne contamination was recovered in the sterile field when the long axis of the operating table was positioned perpendicular to the direction of the airflow with the air passing between the surgeon and the wound. The instrument nurse was positioned upstream of the patient. The minimum airborne contamination was recovered in the cardiac surgery configuration when the long axis of the operating table was also positioned perpendicular to the direction of the airflow. In this case, however, the surgeon was downstream of the patient while the instrument nurse was on the opposite side of the table and upstream of the patient.

Airflow studies indicated the position of equipment in the operating room and the extent to which it is draped can significantly alter the airflow patterns and the levels of airborne contamination at critical work sites. No evidence was found to indicate that the use of a ceiling return air grille at the downstream end of the room adversely influenced the level of airborne contamination at critical worksites.

The capacity of this mechanical air-handling system to remove high levels of airborne contamination in short periods of time and to maintain this low level under repeated severe challenge indicated that this system would have broad application in the hospital environment. Among the most notable applications, besides the neurosurgery and cardiac surgery situations, would be in postoperative intensive care rooms and in the care of leukemic patients with low resistance and patients with organ transplants whose therapy had suppressed the natural immune defense mechanism.

The Elderly and Model Cities Programs

Robert H. Finch, Secretary of Health, Education, and Welfare, and George W. Romney, Secretary of Housing and Urban Development, have announced a joint campaign to provide older people with increased services in the Model Cities program and to encourage them to take a greater role in planning and developing these services.

The campaign is carried on jointly by the Administration on Aging of HEW and the Model Cities Administration of HUD. John B. Martin, Commissioner of the Administration on Aging and President Nixon's Special Assistant for the Aging, and Floyd H. Hyde, Assistant Secretary (for Model Cities and Governmental Relations) of Housing and Urban Development share administrative responsibility.

Under the HEW–HUD agreement, every community participating in the Model Cities program is encouraged to assure representation of the elderly on each model city board or planning body. In Washington, the Model Cities Administration program development staff has hired a special consultant to review projects for their content on aging and to assist local boards and planning bodies in involving older citizens.

The Administration on Aging has urged all State agencies on aging to offer their communities technical and financial assistance for model city developments and to designate a State agency staff member to be responsible for model city activities. In addition, AoA is directly funding research and demonstration projects in model city neighborhoods to provide information on services which can be adapted to needs in many communities. MCA will work with AoA in preparation and distribution of program models and guidance materials to community development agencies.

During August, September, and October, AoA and MCA jointly sponsored a series of meetings in various parts of the nation to stimulate greater involvement of older people in the program. Older people make up a significant percentage of the population of many model city neighborhoods, usually out of proportion to their numbers in the general population.

PUBLICATION ANNOUNCEMENTS

Address inquiries to publisher or sponsoring agency.

The Institute for Cancer Research. Fourteenth Scientific Report, 1966–1968. 1969; 175 pages. Fox Chase, Philadelphia, Pa. 19111.

Salaries and Related Personnel Practices of Voluntary Social and Health Agencies in New York City: September 1968. By Janice Clinthorne. June 1969; 60 pages; $2.50. Research Department, Community Council of Greater New York, 225 Park Ave. South, New York, N.Y. 10003.

Twelfth Annual Institute of the Council of Physical Therapy School Directors on Community Health Aspects of Physical Therapy Education, October 28–November 1, 1968. Edited by Nancy W. Lazlo, Lydia S. Holley, and Barbara White. February 1969. Department of Health Administration, School of Public Health, University of North Carolina, Chapel Hill, N.C.

Internal Control and Internal Auditing for Hospitals. Financial Management Series. 1969; 66 pages; $4.25. American Hospital Association, 840 North Lake Shore Drive, Chicago, Ill. 60611.

Comprehensive Health Planning in the States: A current status report. Health Services Research Center Publication No. 2. July 1969; 24 pages; $1.50. Health Services Research Center, Institute for Interdisciplinary Studies, American Rehabilitation Foundation, 1800 Chicago Ave., Minneapolis, Minn. 55404.

The Science of Social Medicine. By Alwyn Smith, Ph.D., M.B. 1968; 221 pages; 63s ($7.56). Staples Press, 3 Upper James St., Golden Square, London W 1.

The Organization and Continuing Education. By Raymond W. Carlaw, M.P.H., Sandra Hellman, M.P.H., and Nicholas Parlette, M.P.H. May 1969; 29 pages. Program of Continuing Education in Public Health, 655 Sutter St., San Francisco, Calif. 94102.

The Utilization of the Medical Services and Its Relationship to Morbidity, Health Resources and Social Factors. A survey report of the population of Finland prior to the National Sickness Insurance Scheme. By Tapani Purola, Kai Sievers, Esko Kalimo, and Kauko Nyman. 1968; 243 pages. Publications of the National Pensions Institute of Finland, Series A: 3. Research Institute for Social Security, Helsinki 25, Finland.

An Annotated Bibliography of Induced Abortion. Edited by Gunnar K. af Geijerstam, M.D. 1969; 359 pages. Center for Population Planning, 1225 South University Ave., University of Michigan, Ann Arbor, Mich. 48104.

The Virus Diseases of the Rice Plant. Proceedings of a symposium at the International Rice Research Institute, April 1967. 1969; 354 pages; $15. The Johns Hopkins Press, Baltimore, Md. 21218.

The Content of Medical Practice. A research bibliography. By James B. Tenney, M.D. 1969; 69 pages; $1. Johns Hopkins University School of Hygiene and Public Health, Department of Medical Care and Hospitals, 615 North Wolfe St., Baltimore, Md. 21205.

The Organisation of Medical Care Under Social Security. A study based on the experience of eight countries. International Labour Office Studies and Reports, new series, No. 73. By Milton I. Roemer, M.D. 1969; 241 pages; $2.75; Geneva. International Labor Office, Washington Branch, 917 15th St. NW., Washington, D.C. 20005.

SOCIOECONOMIC CHARACTERISTICS OF DECEASED PERSONS, United States, 1962–1963 deaths. *PHS Publication No. 1000, Series 22, No. 9; February 1969; 38 pages; 50 cents.*

World Health Organization

WHO publications may be obtained from the Columbia University Press, International Documents Service, 2960 Broadway, New York, N.Y. 10027.

The Medical Research Programme of the World Health Organization, 1964–1968. Report by the Director-General. 1969; 350 pages; $9; Geneva.

WHO Expert Committee on Medical Rehabilitation. Second report. WHO Technical Report Series No. 419. 1969; 23 pages; 60 cents; Geneva.

Amoebiasis. Report of a WHO Expert Committee. WHO Technical Report Series No. 421. 1969; 52 pages; $1; Geneva.

Developments in Fertility Control. Report of a WHO Scientific Group. WHO Technical Report Series No. 424. 1969; 36 pages; $1; Geneva.

International Drug Monitoring. The role of the hospital. Report of a WHO meeting. WHO Technical Report Series No. 425. 1969; 24 pages; 60 cents; Geneva.

Principles for the Testing and Evaluation of Drugs for Carcinogenicity. Report of a WHO Scientific Group. WHO Technical Report Series No. 426. 1969; 26 pages; 60 cents; Geneva.

Biochemistry of Mental Disorders. Report of a WHO Scientific Group. WHO Technical Report Series No. 427. 1969; 40 pages; $1; Geneva.

The Organization and Administration of Maternal and Child Health Services. Fifth report of the WHO Expert Committee on Maternal and Child Health. WHO Technical Report Series No. 428. 1969; 34 pages; $1; Geneva.

Smallpox Eradication. Report of a WHO Scientific Group. WHO Technical Report Series No. 393; 1968; 52 pages; $1; Geneva.

ph synopses

GEIJERSTAM, GUNNAR af (Karolinska Hospital, Stockholm, Sweden): ***Low birth weight and perinatal mortality, An attempt to define and explain differences between the United States and Sweden. Public Health Reports, Vol. 84, November 1969, pp. 939–948.***

An analysis of Swedish data on incidence and mortality of low-birth-weight infants and a comparison with available U.S. statistics indicates that the higher U.S. infant and perinatal mortality is caused mainly by a higher proportion of low-weight births. Possible reasons for Sweden's more favorable position in this regard may be found in its lower birth rate, its homogeneous population which has no underprivileged minority groups, its social welfare system and compulsory health and sickness insurance, and its well-developed and highly specialized prenatal and maternity care.

All prenatal, delivery, and postnatal services are provided free of charge to everyone as a part of the general health insurance. A screening system is used to detect women at risk for premature birth or other obstetrical complications so that they may be given specialized prenatal and delivery care. As a probable result, 75 percent of all Swedish children—but 80 percent of the premature—are born in maternity hospitals or hospital departments which have obstetrical specialists. The resources of a modern hospital are not immediately available for less than 1 percent of all pregnant women.

LANE, JOHN C. (Armstrong High School, Richmond, Va.), and SCOTT, ROBERT B.: ***Awareness of sickle cell anemia among Negroes of Richmond, Va. Public Health Reports, Vol. 84, November 1969, pp. 949–953.***

A survey of the adult Negro population of Richmond, Va., was conducted to determine the level of awareness of sickle cell anemia. Only 30 percent of those questioned had heard of this disease. Of those who had heard of it, many apparently did not understand the nature of the illness.

Awareness of sickle cell anemia was closely related to the educational level of the persons surveyed. Although the condition is one of the most common chronic illnesses among Negro children, the survey showed that the level of public knowledge of the condition is grossly disproportionate to its importance to the Negro community.

NELSON, MORTON (Alameda County Health Department, Oakland, Calif.): ***Comparative study of two therapies for gonorrhea. Public Health Reports, Vol. 84, November 1969, pp. 980–984.***

The aqueous procaine penicillin G (APP) regimen recommended for treatment of gonorrhea by the Food and Drug Administration and the Public Health Service was compared with a lower dose regimen of APP plus PAM (penicillin with aluminum monostearate) in 225 patients at the Alameda County Health Department venereal disease clinic in Oakland, Calif., a port of debarkation from Vietnam.

The cure rates, as determined by culture, were 77 percent for the 106 patients in group A (all of whom were given 1.2 million units of aqueous procaine penicillin G plus 1.2 million units of aqueous procaine penicillin G with 2 percent aluminum monostearate) and 92 percent for the 119 in group B (the Food and Drug Administration and the Public Health Service regimen); the difference was statistically significant at the $P<0.01$ level by chi-square test.

The 21 women of group B, who received 4.8 million units of procaine penicillin G suspension instead of the 2.4 million units given the men, were all cured. The men of this group had a higher cure rate than the men of group A, but the difference was not statistically significant. No adverse reactions were noted. Results indicated that gonorrhea can still be effectively treated by a single intramuscular injection of a sufficiently large dose of fast-acting penicillin.

PALMER, JUAN R. (Puerto Rico Department of Health), Colón, Aida Z., Ferguson, Frederick F., and Jobin, William R.: ***The control of schistosomiasis in Patillas, Puerto Rico. Public Health Reports, Vol. 84, November 1969, pp. 1003–1007.***

A joint effort of the Puerto Rico Department of Health and the San Juan Laboratories of the Public Health Service to control schistosomiasis in Patillas, P.R., was started in 1952 as an interdisciplinary effort involving biologists, engineers, and physicians. Snails were controlled with a molluscicide, sodium pentachlorophenate, or by drainage of snail habitats. Fuadin chemotherapy was given to children.

By 1962 the prevalence of schistosomiasis among 7-year-old children in Patillas decreased to zero from the original 21.5 percent in 1952, and the snail population was virtually exterminated. The successful program in Patillas, at an average yearly cost of $8,600, provided an estimate of less than $5 million for the snail control phase of an island-wide program in Puerto Rico.

phr synopses

SAID, MOHYI-ELDIN (University of Alexandria, Egypt), GOLDSTEIN, HYMAN, KORRA, AHMAD, and EL-KASHLAN, KHALIL: ***Visual acuity and field of vision of urban and rural Egyptians. Public Health Reports, Vol. 84, November 1969, pp. 955–964.***

A survey of the visual acuity and field of vision of the population was conducted in selected urban and rural areas in Egypt. The objectives were to determine the distributions of measurements of these two factors and to determine whether differences, if any, were associated with sex, age, or an urban-rural environment.

Two contiguous urban districts in Alexandria with an estimated population of about 125,000 and 23 villages located within a radius of 20 miles of Alexandria that had a combined population of about 125,000 were selected as the urban and rural frames from which to sample.

Complete household listings were available and, estimating that there were five persons in the average household, 4 percent random samples of households were drawn to yield about 5,000 persons for examination in the urban areas and a similar number in the rural areas. Because of the difficulty in testing the visual acuity in the young, all children under 5 years of age were excluded from study. Standardized portable equipment was used to measure visual acuity and field of vision in the home.

The results of the study showed that visual acuity and field of vision decreased markedly in males and females in urban and rural areas starting at about 45 years of age. For both males and females, the visual acuity and field of vision of persons in urban areas were significantly better than those of persons in rural areas. Both of these visual measurements in males were significantly better than in females.

UHRICH, RICHARD B. (Public Health Service): ***Tribal community health representatives of the Indian Health Service. Public Health Reports, Vol. 84, November 1969, pp. 965–970.***

The community health representative is the first health aide in an Indian community who is not an employee of the local, State, or Federal Government or the representative of an outside agency. He is an employee of the tribal group who he represents and to whom he is responsible.

For fiscal year 1969, Congress appropriated funds for the Community Health Representative Program and authorized the Indian Health Service to contract with Indian tribes for services of these health representatives. The service was also authorized to provide suitable training for the 185 tribal members selected.

Community health representatives receive 4 weeks of intensive training at the Indian Health Service Training Center in Tucson, Ariz., followed by field training of varying lengths. The intention of the training is not to turn out a health specialist, but to educate the trainee to sense the health needs and bridge communication gaps between the Indian and non-Indian world. Emphasis is placed on identification of health difficulties and use of resources available to serve them.

Although it is too early to provide an indepth evaluation of the impact of these workers, preliminary reports are optimistic. Their presence in the community where they visit individual homes and conduct group meetings has generated an increased demand for health services and brought many patients into health facilities who had previously accepted services infrequently.

On the basis of experience thus far, there is substantial evidence that the program will more than achieve its goal.

LECK, IAN (University College Hospital Medical School, London), HAY, SYLVIA, WITTE, JOHN J., and GREENE, JOHN C.: ***Malformations recorded on birth certificates following A2 influenza epidemics. Public Health Reports, Vol. 84, November 1969, pp. 971–979.***

Records of the National Communicable Disease Center, Public Health Service, were used to identify periods when A2 influenza was widespread in California, Pennsylvania, and Wisconsin in 1955–61 and in 17 Standard Metropolitan Statistical Areas in the eastern United States that were affected by the epidemic of early 1963. Encoded abstracts of the birth certificates of children born in the three States in 1956–61 and in the 17 metropolitan areas in 1962–65 were subdivided according to whether or not birth occurred approximately 26 to 40 weeks after the epidemics. The incidence of clefts of the lip and palate in these subdivisions of the 1956–61 data was compared, and the 1962–65 data were used for similar comparisons of all the common major malformations that were distinguished in the records used.

Reduction deformities of the fingers were especially common among births following the 1963 epidemic. As in a previous series from Birmingham, England, the incidence of cleft lip did not increase after the first widespread epidemic of A2 influenza but was higher after subsequent outbreaks. The other defects examined showed no significant increase in incidence after epidemics.

phr synopses

SBARBARO, JOHN A. (Denver Department of Health and Hospitals), and ONSTAD, G. DAVID: *Preliminary report of a recall program for persons with inactive tuberculosis. Public Health Reports, Vol. 84, November 1969, pp. 985–988.*

The Disease Control Service of the Denver Department of Health and Hospitals recently initiated a program to recall persons whose tuberculosis had been diagnosed as inactive during a 10-year period. The purpose of the survey was (*a*) to discover active cases of tuberculosis and to eliminate further infection of the population from this source and (*b*) to prevent potential reactivation of tuberculosis by offering each person who had bacteriologically negative results a course of prophylactic isoniazid.

From the 1,404 names selected from a register of persons with inactive tuberculosis, only 83 (6 percent) were actually contacted. Of these persons, 69 failed to keep their appointment and did not request a reappointment. Fourteen persons kept their appointments.

Chest roentgenograms and sputum cultures were obtained on all 14 persons. One of the 14 had relapsed to active disease. Five of the remaining 13 accepted preventive isoniazid chemotherapy; eight patients refused. The casefinding rate for the 14 persons was 71.4 per 1,000.

CROOG, SYDNEY H. (Harvard University School of Public Health), and LEVINE, SOL: *Social status and subjective perceptions of 250 men after myocardial infarctions. Public Health Reports, Vol. 84, November 1969, pp. 989–997.*

Two hundred and fifty men in Boston and Worcester, Mass., who had recently experienced a first myocardial infarction were interviewed in connection with a study of social and psychological factors in recovery from heart disease. The patients were between the ages of 30 and 60 and had no previous major ailments. In interviews conducted shortly before they were discharged from the hospital, they responded to a series of questions designed to elicit their perceptions of aspects of the development of their illness and of the degree and content of communication with their physicians.

An exploratory examination of possible relationships between the perceptions and social status of the patients revealed that reported chest pain during the premonitory phase varied positively with status, while reported gastrointestinal symptoms varied inversely. A positive association was found between status and perception of emotional stress as an etiological factor. Patients from the lower status levels reported significantly less dicussion with their physicians concerning the illness, and their perception of advice received indicated possible communication gaps concerning plans for work after convalescence.

VOLINN, ILSE J. (Washington State Department of Health), and SPIELHOLZ, JESS B.: *Relating health and social contacts to the morale of elderly persons. Public Health Reports, Vol. 84, November 1969, pp. 1013–1020.*

A public agency and a private agency in a large city cooperated in a survey of the opinions of aged persons about their health and welfare. The ultimate goal was to develop community services based on their needs as they expressed them.

A random sample of seven city blocks was drawn from the 15 metropolitan census tracts containing the largest number of residents 60 years old and older. Fifteen interviewers, similar in age to the study population, made personal calls and collected data, using a pretested questionnaire.

Data were quantified from a total of 531 respondents and the following statistical measures were applied. Gamma was used as a measure of association among the three ordered variables. A z score tested the degree of certainty with which the null hypothesis could be rejected.

Relationships between health self-evaluation, perception of social ties, and personal morale are the only aspects of the survey discussed in this paper. The emotional impact of changes in health and changes in friendships was assessed. A higher association between health and morale than between social contacts and morale was discovered. An exception to this trend were those persons who believed that their circle of friends had been widening. When friendships were increasing, deteriorating health was not related to low morale. In contrast, when number of friends remained relatively stable or even decreased, deteriorating health could be expected to bring about low morale.

The findings of the study can be applied to the planning of community services for the aged. Priorities should be assigned to preventive, curative, and physical rehabilitative services. Psychological rehabilitation, frequently linked to social activities, nevertheless warrants serious consideration.