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# The Epidemic Intelligence Service of the Center for Disease Control

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*When we speak of innovative approaches in epidemiology we cannot omit the types of innovations in methods of rapid data acquisition that have made such acquisition more facile and expeditious in the very settings in which the epidemic events are occurring. The establishment of an Epidemic Intelligence Service in the Center for Disease Control (or the Communicable Disease Center as it was known in the 1950s) was a natural outgrowth of the philosophy that created the original parent organization of the Center, the Public Health Service's program for Malaria Control in War Areas during World War II.*

*The Epidemic Intelligence Service and its activities made major contributions to American epidemiology and epidemiologic practice in the past 30 years of its existence. Initially providing epidemic assistance and consultation to local health agencies and governments, it furnished the seeds for a surveillance system for many important diseases on a national scale (with international overtones) currently in effect. Such a surveillance system has enabled earlier detection and earlier control of disease.*

*The Intelligence Service's rapid access to disease outbreaks and expert support of local authorities in the understanding and control of such outbreaks has yielded valuable new epidemiologic information and from time to time such major contributions as the solution of Legionnaires' disease. These contributions have earned the Service an international reputation*

*and its basic concepts, initially applied to epidemics of infectious disease, have been applied increasingly and successfully to other diseases and health problems as well and in the context of the Center's newer name—the Center for Disease Control.*

*The father of this innovative service, who persevered over internal political odds and staunchly demonstrated, by repeated example, its great national value, is Dr. Alexander Langmuir, creator of the Epidemic Intelligence Service. He has been honored in the past by the American Public Health Association for this contribution to epidemiology.—LEONARD M. SCHUMAN, MD*

AS WORLD WAR II WAS ENDING, the Communicable Disease Center (CDC) of the Public Health Service was formed as a technical agency charged with the primary responsibility of aiding the States in the control of communicable diseases. It was formed from the administrative and personnel structure of the wartime organization set up to control malaria in military installations throughout the South. Hence the headquarters in Atlanta.

The first charge to CDC was to eradicate malaria from the 14 traditionally malarious States extending from coastal Virginia to Texas. The advent of DDT led many to believe that this was a feasible project, although there were many skeptics.

The founders of the CDC, Joseph W. Mountin, Justin M. Andrews, Louis L. Williams, Jr., and Mark D. Hollis, among others, conceived of the CDC on a

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more grandiose scale than merely as an agency to eradicate malaria. The CDC should become a large agency with experts in all areas of communicable disease control who could help States to advance their established programs, lead in developing new ones, and provide consultation and personnel assistance in solving any problems for which States might seek help.

Epidemiology played a key role in these original plans. The major problem was "where to find epidemiologists of sufficient quality and in substantial numbers." I will recall here how this problem was faced and solved, as well as some major problems and other issues encountered and precedent-setting decisions that were made. I will also express some of my views about the place of field training of epidemiologists in the future.

During the first year of my tenure as Chief Epidemiologist at CDC from the summer of 1949 to 1950, my major concerns were recruiting epidemiologically qualified personnel and fighting an internal bureaucratic battle with the administrators of the National Institutes of Health over CDC's right to mount a broad epidemiologic service program.

An intensive recruiting effort yielded the sum total of two young physicians who were genuinely interested but totally untrained. Our start was slow.

The issue with NIH was long lived and sometimes bitter. NIH officials rightly claimed that over the previous half-century the National Hygienic Laboratory had a brilliant record of investigating epidemics and

providing solutions. For example, plague, tularemia, Rocky Mountain spotted fever, endemic typhus fever, brucellosis, Q fever, pellagra, and the brilliant epidemiologic studies of Wade Hampton Frost on poliomyelitis and influenza were strong supporting arguments. We at CDC countered with our new congressional charter that charged the agency with serving the States in the control of communicable disease, which certainly included the provision of epidemic aid on request. When the NIH officials were asked if they would accept responsibility for answering all such requests, they replied, "Certainly not. Only the interesting ones."

This issue was resolved by a simple agreement that whichever agency received an epidemic aid request would clear the situation with the other before sending out a team of epidemiologists. On several occasions, joint teams were organized. This agreement had two special benefits. First, it meant that the Chief Epidemiologist of CDC was in almost constant telephone contact with the Director of the National Microbiological Institute. Also, a simple but important administrative device was created—the Epidemic Aid Memorandum. On the day that a request was received and a team organized, a formal administratively confidential memorandum was sent to all officials having a "need to know." In the beginning, the mailing list was strictly limited. However, the interest grew apace, and soon more than 200 persons were found to have a valid reason "to know." Since CDC was shortly thereafter answering almost all epidemic aid requests, the Epidemic Aid Memorandum became a valuable communication and education tool.

The CDC was born at the beginning of the atomic age, an age when intense controversy raged among physicians, epidemiologists, and the military over biological warfare. The subject was so shrouded in secrecy that it could not be discussed in an open scientific fashion. I was deeply involved in this situation, and I took the position that it would be prudent to mount a major program of recruiting and training epidemiologists and to establish the closest possible bonds of respect and communication with State and local health authorities. Since there was already a dearth of epidemiologists for normal civilian needs, the need for epidemiologists was even greater if biological warfare were even a slight probability.

This CDC position was universally accepted, and a program for recruiting and training epidemiologists was authorized. During the discussions leading to this crucial decision, Dr. Joseph W. Mountin, Assistant Surgeon General and veritable godfather of CDC, blurted out one day, "What we need is an Epidemic Intelligence Service." That is what he got. No one had the temerity to point out the administrative inconsistencies in this term. Nor has anyone seriously proposed changing the name, although it is poorly descriptive of the broadened functions and responsibilities of the present-day organization.

While the recruiting was discouragingly slow in 1949–50, in early September 1950, within 1 week, a series of applications for active duty in the CDC with preference for an epidemiologic assignment came across my desk. It was not difficult to discern the reasons for this change. The Korean War had begun in June 1950; a medical draft would become effective in July 1951. These applicants were interested in serving their draft obligations in an epidemiologically oriented tour of duty. Dr. Myron E. Wegman at Louisiana State University, Dr. James Watt, an NIH officer assigned there, and Dr. Walsh McDermott of Cornell University, were among the strongest supporters of this idea.

A simple recruiting letter was sent to the chiefs of services of departments of medicine and pediatrics, to professors of preventive medicine in all medical schools, and to the professors of epidemiology and deans of the the schools of public health. The response was encouraging. Early in July 1951, 22 physicians and 1 sanitary engineer reported for duty in Atlanta, and the Epidemic Intelligence Service (EIS) was launched.

### **The Epidemic Intelligence Service**

As the program progressed from problem to problem, a series of precedent-setting decisions were made that have developed into lasting traditions.

**The EIS course.** Each new class of recruits begins in Atlanta with an intensive, practical orientation course. In the first year, because of lack of CDC staff a stellar faculty was brought in from Johns Hopkins—John Hume for public health administration, Philip S. Sartwell for epidemiology, and Abraham M. Lilienfeld for biostatistics. The traditional Johns Hopkins case-study method was stressed in the teaching as the best way to prepare officers for epidemiologic investigation in the field.

In the ensuing years, CDC staff assumed responsibility for the orientation class—with assistance from visiting professors. From the beginning, the emphasis of the course content was strictly academic, albeit practical epidemic problems were examined in depth. No effort was made to orient recruits to the program of the CDC or to the organization of the Public Health Service because it was thought that such knowledge is better acquired on the job than from lectures or seminars.

As the course expanded in size and scope—reaching more than 100 students, including many visitors and guests who were not EIS officers—the group was divided into sections for a substantial part of the day. These sections were led by teams of two EIS officers, most of whom had had only 1 year of experience. The decision to have junior staff members was based on the belief that one learns more from a colleague only slightly more experienced than from a senior staff member.

The section leaders were required to devote full time to the course, beginning 3 weeks before the recruits arrived. Every problem was reworked, and at least one new problem was introduced as a matter of policy. Thus, the EIS course was a training ground for teachers of epidemiology as well as an orientation for new officers.

**Assignments.** After completing their orientation, the officers were assigned to one of three general types of duty. Approximately half were assigned to specific positions in the CDC headquarters or its field stations. Others were assigned to State epidemiologists—strategically located around the country—who were in sympathy with the program and the restrictions placed on the officers. A small number were assigned to consultants in university situations of particular concern to CDC; these officers also were under restrictions.

The restrictions were severe. First, all officers must be on call for epidemic aid duty at all times. Second, if an emergency arose, any officer could be called to duty "on the orders of the Surgeon General." Furthermore, it was expected that each officer would be called more

than once a year. Third, each officer should be free for special conferences and in-service training courses deemed necessary for their development as broadly based epidemiologists and officers of the Public Health Service. Some State health officers and consultants fretted at these restrictions—but although the restrictions were compassionately enforced, they were rarely relaxed.

The types of assignments were determined by the sources of funds to support the program. All funds were for categorical disease programs. None were ever earmarked for educational or training purposes per se. Experience proved that well-selected, properly grounded, professional men and women could perform outstandingly well in the situations CDC encountered—if given a basic orientation and then supported in their field duties, with direct professional communications to and from headquarters. A clear distinction was always drawn between administrative lines of authority that were strictly observed and professional lines of free flow of scientific facts and ideas that were encouraged.

When substantial funds for the promotion of immunization became available, a larger proportion of officers were assigned to State and local health departments.

**Epidemic aid duty.** From the beginning, the importance of prompt response to every request from a State for epidemic aid or consultation received the highest priority, regardless of the importance of any particular research activity an officer might have been engaged in. After all, this concept was in the basic charter of the CDC, and it was the principle that won the epidemic aid function from the NIH.

In practice, the strict enforcement of this provision set the character of the whole program. State health officers were astounded to find bright, young, responsive epidemiologists in their offices the next morning, or even sometimes the same day that they called. Each epidemic aid call was an adventure and a training experience, even the false alarms. Many of the calls led to totally new and unexpected situations that resulted in research programs, often of major significance. A high proportion of the many hundreds of papers published by EIS officers have dealt with or have been developed from, an epidemic aid call.

**Major problems encountered.** The disease problems and specific programs encountered ran the gamut of the problems current at the time. Any situation to which the term “epidemic” could be even remotely tied was accepted as within our jurisdiction, at least for a preliminary investigation. On several occasions, such sorties into borderline areas led to major developments.

In the early 1950s, poliomyelitis was the dominant problem. It seemed to be on a rampant increase, peaking to a total of 50,000 reported cases in 1952. Poliomyelitis continued through the 1950s and well into the 1960s as probably the leading concern. We embarked on a national evaluation of gamma globulin in 1953, participated heavily in the Francis field trial of inactivated polio vaccine (Salk) in 1954–55, and played a crucial role in the resolution of the Cutter incident and the practical field evaluation of polio vaccine beginning in April 1955. This experience led to the establishment of the poliomyelitis surveillance program that continued through the problems of the introduction and safety of the oral attenuated polio vaccine from 1961 to 1964 and that has continued to operate at reduced levels to the present time.

The encephalitides, western, eastern, St. Louis, and later California and Venezuelan types always received and have continued to command priority attention when they appear so unpredictably and with so much public hysteria.

Hepatitis was so slowly recognized as a public health problem that CDC did not become involved until the late 1950s and during the national epidemic of 1961, especially with the recognition by EIS officers of the role of shellfish in Pascagoula, Miss. and Raritan Bay, N.J. The hepatitides now are a major problem.

Influenza was almost dormant through the mid-1950s, but it became and remained a major problem beginning in 1957 during the pandemic of Asian flu. At that time, CDC was directed by the Surgeon General to establish an influenza surveillance program along the lines that were so successful with poliomyelitis beginning in 1955.

Hospital-acquired infections were early considered the province of the surgeon, the medical faculty, and the hospital administrator, rather than the health officer. However, this situation changed abruptly with the massive nationwide epidemic of antibiotic-resistant staphylococcal infections, particularly phage type 80/81, in 1957 and 1958. Since then, the study and control of nosocomial infections of all types, especially the Gram-negative bacterial infections, have been among the most important activities of EIS officers.

In the early 1960s, clusters of leukemia cases attracted national attention because of the intriguing hypotheses of a possible viral, and therefore communicable, etiology. The EIS promptly investigated each episode with the full support of the National Cancer Institute. The tangible results to date have not equaled the enthusiasm of the effort, but the EIS officer most active in this approach later headed the Cancer and Birth

Defects Section—now the Chronic Disease Division of the Epidemiology Bureau of CDC.

In 1964, an EIS officer was assigned to the Department of Obstetrics at Grady Memorial Hospital, Emory University, and thus the Family Planning Evaluation Program of CDC began. This program was justified on the grounds that the population explosion was the most serious epidemic of all. The rapid growth of this program and the broad support that it has received show that epidemiology has a contribution to make to this problem.

**Recruitment.** As mentioned earlier, the first class of EIS officers was recruited through spontaneous applications plus a letter to key sources. Since that time, the problem has mainly been one of controlling the flow of applicants. The Korean War, the continuing draft of medical personnel, the increasing tension of the Vietnam War in the 1960s, coupled with the military provision of offering draft deferments for later active duty, presented us with a steady flow of applicants and a serious problem of selection. The practice of many admissions committees to medical schools was adapted. A special effort was made to obtain a personal interview plus meaningful, confidential appraisals. As the body of our graduates increased, they became our most effective recruiters and sources of discriminating information about the candidates. To a large extent, after only highly qualified candidates were selected on the basis of their academic records, the final decision process was often self-selection. Suitable candidates were told of the severe restrictions placed on all assignments:

- being on call for national and even international epidemic aid service;
- having little or no opportunity for enhancing their clinical skills for a period of 2 years;
- having no opportunity to negotiate in advance the location of their assignments until the whole group met in the spring for a grand review of available positions.

Facing these requirements, many candidates opted for the military services. The hardy ones who remained were thus adventuresome, willing to explore and travel, interested in infectious diseases, and at least susceptible to an epidemiologically related career.

**Career development.** All recruits accepted a 2-year commitment of draft-obligated duty, but the long-term objective of the program was to train career epidemiologists, not only for vacancies in the expanding CDC but elsewhere in the Public Health Service, other Federal agencies, and State and local health departments. No doubt there would be an overflow into the academic and commercial worlds, but this was not a stated ob-

jective of the program. In 1956, we began a Career Development Program, adapted from comparable programs in the military services, which in essence was a plan to match supported academic or residency training of the officer's choice for future active duty of our choice. This plan proved exceptionally popular, and the maximum number of officers that could be accommodated by our budget were selected for this Career Development Program. These officers are now holding major positions in CDC and many other organizations.

**The EIS Conference.** In the spring of 1952, a 1-week conference for all EIS officers was held in Atlanta. Since then, the conference has been an annual event that has had a major effect on the educational development and cohesiveness of EIS officers. The conference is conducted along the lines of an open scientific meeting. The EIS officers report on work done during the previous year. Papers presented are limited to 10 minutes, and another 10 minutes are allowed for discussion, which is candid and often relentlessly critical. The peer pressure for excellence in presentation is a key feature of the discussion.

Recruits who will be entering active duty the following July, and those with deferments or training commitments who will be entering in later years, are invited to the conference. Those who attend gain an in-depth understanding of the kind of program they are joining and the types of problems that they will soon be encountering. During the weekend immediately following this conference, the recruits meet and discuss the opportunities for their assignments. They are permitted to state their preferences; then, a modified type of intern matching plan is instituted, and the decisions are reached. Nearly always, an officer receives an assignment that is congruent with his background and interest.

All officers who have graduated from the program are invited to return to the conference to refresh their contacts and to keep abreast of the latest developments in epidemiology. Nearly always it has been possible to pay the expenses of these officers on the grounds that they are being kept in close contact with the CDC, with the others who are active in the field, and therefore they will be far better prepared to respond in the event of any truly national emergency when a large number of epidemiologically trained and oriented persons may be needed. Furthermore, they become acquainted with each other. Thus, one of the original propositions justifying the creation of the Epidemic Intelligence Service has been achieved.

**International duty.** With respect to the international health experiences that EIS officers have gained, briefly,

LANDMARKS IN AMERICAN EPIDEMIOLOGY

Table 1. Epidemic Intelligence Service officers, by professional category and period of entry into the Service

Professional category	1951-60	1961-70	1971-80	Total
Physician	150	391	384	925
Veterinarian	33	36	11	80
Statistician	21	21	2	44
Nurse	5	1	5	11
Sanitary engineer	2	1	...	3
Microbiologist	5	6	...	11
Anthropologist	1	...	1	2
Dentist	1	1	2	4
Mycologist	...	1	...	1
Public health advisor	...	1	3	4
Demographer	...	1	...	1
Biologist	...	1	...	1
Health services officer	...	...	2	2
Graduate epidemiologist	...	...	1	1
Pharmacist	...	...	1	1
<b>Total</b>	<b>218</b>	<b>461</b>	<b>412</b>	<b>1,091</b>

the policy has been to get them as deeply involved as possible. Dozens of officers participated in the later stages of the ill-fated efforts at malaria eradication. More than 100 participated at all levels, over the full 10 years, of the successful smallpox eradication program. In fact, the director of the smallpox program and many of his major lieutenants had been in the EIS program. At least 50 officers served long or short tours of duty with the Cholera Research Laboratory in East Pakistan, later to become Bangladesh. They worked not only on cholera, but on all diarrheal diseases, the family planning evaluation and demographic studies, and famine relief after the great cyclone in the fall of 1970.

In addition to heavy participation in such organized international programs, EIS officers or career officers who were former EIS officers answered a large and uncounted number of epidemic aid missions for a wide variety of common and exotic diseases in every corner of the globe. These missions were in collaboration with the World Health Organization or the Agency for International Development, or in more direct bilateral relationships.

**Professional representation.** The numbers of EIS officers recruited into the program, by period of entry during 1951-79, are shown in table 1. Throughout these years, moderately high—but not exclusive—preference was granted to physicians because a broadly based epidemiologist needs thorough grounding in medicine, including at least a year of internship. This reasoning is now becoming subject to controversy and reevaluation, but in my judgment the decision was and remains sound.

The EIS program representation, however, has never been strictly medical. Veterinarians (selected by Dr. James H. Steele) have comprised about 8 percent of the recruits and statisticians (selected largely by Dr. Robert E. Sertling) almost 5 percent. A wide range of other types of professionals had minor participation in the program.

**Batting average.** The EIS has always focused on preparing persons who would remain in epidemiologically related careers. We speak glibly of the “batting average” of success, but such a measurement turns out to exceed the capability of the epidemiologists directing the program or of the recruits themselves. The problem is illustrated in table 2, which shows the occupations of 979 officers who completed the 2-year EIS tour of duty. Of these, 59 are in residency, fellowship, or other graduate study, and their careers are not yet determined. Many are known to be oriented toward public health, preventive medicine, or epidemiology. But, many are also directed toward the more contemporary areas of community medicine, family practice, and comprehensive care; it is difficult to classify these officers as successes or “near misses.” Certainly they cannot be classed as failures, because epidemiology surely has a contribution to make in these newer areas.

Even the EIS officers who have entered private practice or business cannot be called “complete failures.” Many of these are loyal, active recruiters to the program; they serve as eyes and ears within the areas of their activities and have often reported the first occurrences of new and serious epidemics. A substantial number return to the EIS Conference each spring for the educational experience as well as to maintain contact

Table 2. Current locations and occupations of Epidemic Intelligence Service officers who entered on duty from 1971 to 1977

Location	Physicians	Veterinarians	Others	Total
Federal Government	146	20	40	206
CDC	104	10	30	144
Other HEW	20	5	9	34
Other Federal Government	22	5	1	28
State or local health department	49	10	2	61
Other health agency or group	72	2	...	74
University faculty (full-time)	250	11	17	278
Residency, fellowship, or other graduate study	55	3	1	59
Private practice or business	257	27	12	296
Other	4	...	1	5
<b>Total</b>	<b>833</b>	<b>73</b>	<b>73</b>	<b>979</b>

with old friends—again, fulfilling a basic objective of the program.

It is not possible to count precisely hits, runs, and errors as in baseball, so I will not quote percentages. However, 146 physicians, 20 veterinarians, and 40 other professionals are now employed in the Federal Government, almost all in epidemiologically related positions (table 2). The CDC is heavily laced with EIS graduates who are in top positions.

Of the 61 graduates who are full-time employees of State and local health departments, 49 are physicians. Many are or have been State epidemiologists who have been promoted to higher administrative levels; six are or have been State health officers. Although it is not difficult to label these graduates “total successes,” it is impossible to determine how many may have settled upon such careers before joining the EIS. The graduates who are holding positions in the States are an enormous asset with respect to the speed of communication and maximum understanding between CDC and State and local levels when all manner of problems arise.

The 278 graduates holding full-time positions in universities are not possible to categorize in terms of “success.” Of these, 84 are full professors—65 in medical schools, 5 in schools of public health, 7 in veterinary schools, and 7 in departments of statistics. Many are heads of departments.

While counting successes in the batting average, I should mention that three EIS graduates became directors of State laboratories; one, a director of one of the National Institutes of Health; two, deans of schools of public health; one, a vice president for medical affairs; one, a university president; six, Assistant Surgeons General; and one, a Surgeon General.

## Conclusion

Measured in any terms, the EIS program successfully achieved its original objective of increasing the numbers of trained and experienced epidemiologists for civilian and perhaps military defense needs. The 979 graduates constitute a loosely affiliated, deeply loyal, warmly responsive group of epidemiologists—now widely dispersed throughout the nation and to an expanding number of countries overseas. All have had practical experience in the field investigation of epidemics and the surveillance of diseases. Many have participated in collaborative research studies. Many more have the common bond of shared communications over a number of years and the repetitive participation in the annual EIS Conference. All are knowledgeable about the intricacies of the Public Health Service and

associated Federal agencies and their relationships with the States. All have worked successfully within their particular bureaucratic confines.

If a true national disaster of massive proportions were to occur, either civilian or military, the 61 EIS graduates in State and local health departments and the 206 now on duty in the Federal Government would form a disciplined cadre of experts who know each other and how to work together. They would instantly fill the appropriate slots in the unique bureaucratic structure that would have to be set up at the time to meet the needs of the particular disaster. The remaining 712 EIS graduates, not now in public employment, would constitute a substantial reservoir of additional manpower, also well-oriented to the program. The vast majority of these would respond to a call to duty. The present state of epidemiologic readiness is in marked contrast to that at the beginning of World War II.

Aside from meeting needs for disaster manpower, the EIS also has contributed substantially to the total pool of epidemiologists. But, by any broad evaluation, the total need is far from being met. The reason for this deficiency, in spite of the large and steady flow from many sources, is easy to identify. After all, epidemiology always has been, is now, and should forever be, the basic foundation of public health interpreted in its broadest sense. Good academic training plus field experience is the best preparation for advancement up the administrative ladder. Only too soon, epidemiologists with demonstrated skills in working successfully in community situations (this is in itself a good definition of epidemiology) are drafted to higher positions. The national need and demand for qualified epidemiologists is insatiable and growing; the international needs are substantial and continuing. The only answer is to increase the flow of new recruits to this field.

The EIS program cannot possibly meet this need and, in my opinion, should not be expected to. Having many independent sources is the soundest American approach. Great reliance should be placed on the universities, but they, too, have been so far insufficient.

The logical approach seems clear. Every large organization in the health field, the agencies of the Department of Health and Human Services (formerly Health, Education, and Welfare), the major health departments in States and large cities, and the growing number of organizations providing comprehensive health care should install on-the-job practical training programs adapted to their particular needs and financed within their own budgets, as was the EIS. Such in-service training programs should be recognized as essential to performance, just as the internship and residency programs are essential to the operation of hospitals. Fur-

thermore, such trainees can earn their keep many times over.

If such in-service training programs were adopted, the plans should include appropriate academic graduate study, of widely varying scope, in universities not only in this country but overseas.

Some may argue that I am merely describing the well-established residency programs of the American Board of Public Health and Preventive Medicine and its subspecialty groups. I fully concur in this position, but with two points of emphasis. First, operating health agencies must assume greater responsibility for recruit-

ing and training their staffs. Too many now blithely rely on the academic institutions to deliver fully trained products for them to employ, with too little obligation to assist in the recruiting and training of suitable candidates. Second, many academic institutions have too limited outlets for the integration of bona fide practical field experience with their sometimes ivory tower, theoretical approaches.

Perhaps this story of EIS has provided some useful examples of problems encountered and solutions found that may help in expanding the flow of epidemiologists for the future benefit of all.

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