

Communicable disease control: the development of a laboratory associated national epidemiological service in England and Wales

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Summary

The Communicable Disease Surveillance Centre was established within the Public Health Laboratory Service on 1 January 1977 to assist nationally in the coordination of the investigation and control of communicable disease in England and Wales. It has developed into a laboratory based epidemiological service with an information centre at Colindale and specialist community physicians also located in different parts of the country. The association of the service with laboratories has enabled the integration of surveillance programmes using both laboratory and clinical data. The creation of regional specialist posts in community medicine has already provided much closer specialist support and coordination to community physicians locally responsible for communicable disease control which it is intended to extend by the creation of further posts in the future.

CDSC is the first epidemiological unit in the country with service responsibilities nationally and with the capability of deploying specialist community physicians to meet local needs, a type of epidemiological organization which could be developed for the control of other acute disease and chronic disease.

INTRODUCTION

The Communicable Disease Surveillance Centre (CDSC) of the Public Health Laboratory Service (PHLS) was set up on 1 January 1977 to provide epidemiological assistance and coordination in communicable disease control for public health authorities in England and Wales.^{1,2} The purpose of this paper is to describe the development of the Centre and its work during its first three years.

BRITISH PUBLIC HEALTH SERVICES

Organized public health in Britain began in the middle of the nineteenth century with the creation of public health departments in local authorities headed by medical officers of health³ who were epidemiologists concerned mainly with the prevention of infectious disease and the improvement of local environmental hygiene and sanitation. After the turn of the century, the continuing high infant mortality rates led their successors to add to the existing environmental health service personal health services for children, which in later years were

extended in many other fields. The medical officers of health became increasingly involved as medical administrators of these services rather than as epidemiologists. This change of emphasis from epidemiology to medical administration coincided with the advent of modern microbiology and only a few health departments developed adequate laboratory services. Furthermore, at the same time the epidemiology of many infectious diseases, particularly the foodborne diseases, changed from local diseases to nationally and internationally spread diseases and public health departments lacked the means for rapid integration of information which became necessary to control widespread outbreaks.

These deficiencies in the public health services were remedied in 1939 by the creation of the Emergency Public Health Laboratory Service, which subsequently became permanent in 1946 as the PHLS.⁴ This service, staffed by medical microbiologists, provided expert microbiological advice and assistance in infectious disease control and developed a rapid information system based on laboratory data. The close collaboration of this national laboratory service with the local public health services staffed by medical officers of health, public health inspectors and nurses proved an effective means for the investigation and control of infectious disease until the 1970s.

In the 25 years following World War II there was an unparalleled increase in movement of population both nationally and internationally with consequent implications for the spread of communicable disease.⁵ The appreciation that in Britain the local public health services with the national laboratory service could not alone adequately meet the changed needs for communicable disease control came about following an outbreak of smallpox in London in 1973.⁶ The Committee of Inquiry into this outbreak recommended the establishment of a national information and coordinating centre with epidemiologists located in regions of the country. This recommendation became more urgent when the National Health Service (NHS) reorganization in 1974 weakened the medical role in communicable disease control by the replacement of the MOH and his supporting public health department, with executive responsibility in this field, by the medical officer for environmental health (MOEH) with much diminished supporting staff and mainly advisory functions. The CDSC was established to meet this new need for a national epidemiological service.

The PHLS has for many years included an Epidemiological Research Laboratory, which established the national laboratory reporting system, and working with medical microbiologists in the Service has gained international recognition for its research in communicable disease epidemiology, particularly in the fields of vaccine trials and surveys. The creation of CDSC extended the epidemiological functions of the PHLS beyond epidemiological research to embrace national responsibility for communicable disease surveillance and control and a commitment to training community physicians in communicable disease epidemiology. CDSC is a service unit, rather than a research or academic unit, with three main functions: (a) surveillance, (b) investigation and control of communicable disease and (c) training and teaching,¹ especially MOEH, environmental health officers and others concerned in communicable disease epidemiology.

On 1 November 1977 CDSC assumed responsibility on behalf of the Chief Medical Officers of the Department of Health and Social Security (DHSS) and Welsh Office for national advice, assistance and coordination in communicable disease control formerly provided by medical officers of DHSS. In exercising this national responsibility for communicable disease control CDSC is concerned in all incidents of national importance and in all outbreaks extending over more than two or three districts, although the executive responsibility remains with the appropriate local authority and health authority. It is the function of CDSC to provide advice and assistance to the officers of these authorities whenever required and to coordinate their work in communicable disease control.

MOEH and their environmental health officer colleagues now provide information about communicable disease incidents to CDSC, which was previously provided for DHSS, and this

often complements information derived from laboratory reports to produce a more comprehensive picture of communicable disease in England and Wales. MOsEH inform CDSC as soon as they become aware of any serious or unusual incident or outbreak of communicable disease in the community or in hospitals, whether or not it is a statutorily notifiable infectious disease. They provide routine reports on outbreaks of food poisoning and on all cases of anthrax, cholera, diphtheria, plague, poliomyelitis, rabies, smallpox, typhoid and paratyphoid fevers and viral haemorrhagic fevers. This increasing contribution by MOsEH is reflected in the development of the weekly communicable disease report (CDR) from its original form as a compilation of laboratory reports to a more broadly based communicable disease information bulletin, which is distributed not only to microbiologists but to all community physicians and chief environmental health officers.

ORGANIZATION OF THE COMMUNICABLE DISEASE SURVEILLANCE CENTRE

CDSC comprises a group of community physicians, with special training and experience in communicable disease epidemiology, organized nationally in England and Wales with associated scientific, administrative, clerical and secretarial staff. The staff are all employed within the PHLS and the Director is responsible through the Director of the PHLS to the PHLS Board which is answerable to DHSS and the Secretary of State for Social Services for the provision of the service. The specialist community physicians, although part of the PHLS, a microbiological service organizationally separate from NHS regions, areas and districts, are members of the specialty of community medicine with the same status as other specialist community physicians within the NHS. To conform with NHS titles they have been designated SCM (Epidemiology).

The main purpose of setting up CDSC within the PHLS rather than as a separate national organization was to ensure the development of close working relationships between the specialist community physicians and microbiologists so that full use could be made of their epidemiological expertise and laboratory facilities in field investigations and surveillance. Although many hospital microbiologists in England and Wales are employed by NHS regions and not by PHLS their working relationships with CDSC are the same.

The surveillance function of CDSC is centred at Colindale, North London, where four specialist community physicians, one senior medical officer seconded from DHSS and most of the associated scientific staff are based. It is here that the national laboratory reporting system is managed, that data from other communicable disease information systems and reports from MOsEH are collated and the CDR is produced. An information service by telephone and post is provided for MOsEH and others concerned in the control of communicable disease and a 24 h 'on-call' service is maintained by the specialist community physicians of CDSC, on rota, to provide advice and assistance in incidents of communicable disease when required. Frequent communication is maintained with PHLS reference and other laboratories, with DHSS, the World Health Organization and with other national epidemiological units. In addition to these routine surveillance functions at Colindale, the CDSC accommodation is able to become the national coordinating centre in the event of a major communicable disease incident.

There are two PHLS specialist community physicians located in regional public health laboratories and it is proposed to increase this number to between 10 and 15 in the next few years. The main function of these regionally based specialist community physicians is the field investigation and control of communicable disease in support of local MOsEH, working through the laboratory services, but all PHLS specialist community physicians are available to be deployed to any part of the country at any time when required.

SURVEILLANCE AND DISEASE CONTROL

The Director of CDSC and a secretary took up their posts on 1 January 1977 and were joined by a senior medical officer seconded from DHSS. Other appointments during the year enabled the centre to become fully operational in November 1977. Since this time CDSC specialist community physicians have been involved in the surveillance of all communicable disease and have taken part in many field investigations.

Smallpox

In August and September 1978 a laboratory associated case of *Variola major* and one secondary case occurred in Birmingham.⁸ The work of CDSC in this major infectious disease emergency demonstrated the value of its national coordinating and information roles. It showed also the value of having a national team of specialist community physicians, who although normally located in different parts of the country could be brought together to assist locally in a major incident. A CDSC national control centre was set up and informed immediately all public health laboratories and port and airport medical officers of details of the primary case and maintained communication throughout the incident with all local MOsEH and microbiologists outside Birmingham, with DHSS, WHO and countries to which possible contacts travelled. Early in the incident three specialist community physicians were deployed to Birmingham, two of whom had had experience in the WHO smallpox eradication programme, to assist the MOEH in the identification and tracing of contacts. Later, they were joined by senior registrars in community medicine from CDSC and colleagues from the Communicable Diseases (Scotland) Unit (CDS) to make a team of six community physicians who played an important part in the surveillance of contacts in Birmingham. In 1978 and 1979 CDSC contributed to international commissions on smallpox eradication in The Sudan and Ethiopia.

Imported disease

CDSC has maintained surveillance and assisted in the control of communicable disease acquired abroad. The viral haemorrhagic fevers have assumed particular importance and, although no confirmed cases have been reported in the United Kingdom since 1976, MOsEH undertook surveillance of all suspected cases. An analysis by CDSC of published experience of Lassa fever and Marburg disease and of the British experience in 1976 and 1977 concluded that the community spread of these diseases in the United Kingdom was very unlikely and that the main potential risk was of hospital or laboratory spread.⁹ There were between 30 and 40 suspected cases of viral haemorrhagic fever each year, in about half of which the final diagnosis was malaria.

Malaria has increased in the United Kingdom from about 100 cases a year in the 1960s to 1909 cases in 1978, consequent upon the increased prevalence of malaria in the world and the greatly increased passenger traffic between the Indian subcontinent and West Africa and the United Kingdom. Of the 1909 cases in 1978, 349 (18 per cent) were of falciparum malaria and 10 deaths were reported. It is hoped to improve malaria surveillance in the future by bringing together notifications with laboratory reports and reference laboratory data.

Two cases of human rabies in England were reported to CDSC in 1978, both of which acquired the disease in the Indian subcontinent. CDSC was concerned in investigating persons possibly exposed to infection abroad and, in cooperation with the virus reference laboratory of the PHLS, ensuring immediate prophylactic vaccination where appropriate. In

one incident in which a rabid cat attacked a holidaymaker in a hotel in Tunisia 730 persons in the same hotel were traced and 18 offered prophylactic vaccination against rabies.

Typhoid and paratyphoid fevers are now mainly imported diseases and their surveillance has been improved by integrating clinical notifications with laboratory reports. About 250 cases of typhoid were reported each year, over 90 per cent of which acquired the infection abroad, most commonly in the Indian subcontinent. Of approximately 100 cases of paratyphoid fever reported each year, half were due to *Salmonella paratyphi A* and half to *S. paratyphi B*. Again, over 90 per cent were infected abroad, most *S. paratyphi A* infections in the Indian subcontinent and most *S. paratyphi B* infections in the Mediterranean and Middle East. CDSC community physicians assisted in the investigation of four outbreaks. The first comprised 5 case of typhoid, 4 of *Shigella sonnei* and 6 of *Shigella flexneri* dysentery, in 10 different health areas in England, in Holland and in the Channel Isles, which were associated with infection on a holiday cruise. The second outbreak took place in many different parts of the country in holidaymakers who had stayed in the same resort in Spain. There were 19 cases infected with *S. typhi* of 6 different Vi-phage types, 2 associated cases of *S. paratyphi B* infection, 3 of salmonellosis and 2 of *S. sonnei* dysentery. The third outbreak was due to hospital cross infection; there were 4 cases who had undergone duodenal intubation in a gallstone clinic where they were under treatment. The source of infection was probably a biliary carrier who was subsequently discovered amongst the other patients who had undergone duodenal intubation at the same clinic. The fourth outbreak comprised 4 patients all of whom had eaten meals at the same restaurant in which one of the staff was found to be a carrier of *S. typhi* of the same Vi-phage type as the patients.

Food poisoning and salmonellosis

Salmonellosis is the commonest reported foodborne disease in England and Wales. Laboratory reports showed an increased incidence in recent years and a change in the distribution of serotypes probably due to infection in poultry and the greatly increased consumption of poultry meat.¹⁰ The surveillance system was based on laboratory reports and in consequence episodes of food poisoning in which a microbiological agent was not identified were often not reported. Furthermore, these reports were not related to infections in animals reported to the Ministry of Agriculture Fisheries and Food (MAFF). To overcome these deficiencies CDSC is planning a combined clinical and laboratory reporting system in cooperation with MOsEH which will provide information required both for national surveillance and for the proposed WHO surveillance scheme for foodborne diseases and intoxications in the European Region. To provide the link with data on animal infections a veterinary epidemiologist has been appointed to CDSC and to the Veterinary Epidemiology Unit of MAFF who will develop joint medical/veterinary surveillance of salmonellosis and other zoonoses.

Salmonellosis in hospitals and old people homes is an important problem because the disease is often more severe in the very young, the sick and the elderly, and occasional deaths occur. Between 40 and 50 outbreaks have been reported each year; one of these in which CDSC specialist community physicians and a nurse epidemiologist were concerned was traced to continuing infection from contaminated ward cleaning mops and buckets. This episode demonstrated the value of a nurse epidemiologist and a full time post is being created in CDSC.

Following the outbreak of botulism due to canned salmon in Birmingham in 1978,¹¹ CDSC specialist community physicians have been involved in the investigation of other food poisoning outbreaks due to post-processing contamination. These included several widespread outbreaks of staphylococcal food poisoning due to canned corned beef and six outbreaks associated with canned salmon, in which no cause was found but which were probably also staphylococcal.

Campylobacter enteritis

CDSC began surveillance of campylobacter enteritis, a recently described infection,¹² in 1977 using laboratory data. In that year there were 1365 isolations reported and in 1978, 6346. The source of infection of most of these was not discovered but in about 100 there was a possible association with poultry and in about 50 a possible association with pet dogs or farm animals. Of particular interest were investigations by CDSC specialist community physicians into several large outbreaks which were shown to be due to unpasteurized or inadequately pasteurized milk.¹³

Hepatitis

Changes in the epidemiology of hepatitis in England and Wales have been demonstrated by the surveillance of statutory notifications of infective jaundice, of laboratory reports of hepatitis B infections and by field investigations. The number of notifications of infective jaundice declined but proportionately more cases were reported in adults, particularly males. Outbreaks of hepatitis A affecting adults, with a higher incidence in males than females, have been traced to shellfish¹⁴ and outbreaks of hepatitis B, again affecting mainly male adults, have been traced to acupuncture¹⁵ and tattooing.¹⁶ It is possible that the fall in notifications and change in age distribution is due to a decline in the incidence of hepatitis A in children with resulting prominence of hepatitis B in adults, particularly males. However, there may also have been an increase in foodborne hepatitis A in adults due to shellfish.

Enterovirus infections

Poliomyelitis is now a rare disease in England and Wales but in 1976/77 there were 28 cases, 2 of which were infected abroad. Surveillance of notified clinical poliomyelitis and laboratory reports was maintained by CDSC in collaboration with the Epidemiology Research Laboratory of the PHLS whose staff undertook detailed investigations of any possible vaccine-induced disease.¹⁷ The 1976–7 outbreak was due to type 1 virus, most of the cases were in young children and only one of the 28 cases had previously received a full course of three doses of oral poliovaccine. The outbreak appeared to be part of a widespread outbreak in unvaccinated communities in Western Europe, the largest number of cases being reported in the Netherlands.¹⁸ The outbreak demonstrated the close contiguity of the population of European countries and therefore the need for national epidemiological centres to continue to work closely together. Surveillance of laboratory data of other enteroviruses in England and Wales showed a widespread outbreak of Echovirus type 11 infection beginning in late 1977 and continuing in 1978. The outbreak was unusual because there were several small outbreaks in special care baby units with deaths in neonates; the first of these was reported from Cambridge with three such deaths.¹⁹

Respiratory virus infections

Influenza surveillance is an important activity of CDSC, and in 1978 this was developed by bringing together the traditional mortality and morbidity indices²⁰ with the PHLS laboratory based general practice surveillance scheme,²¹ and publishing the findings as a weekly influenza surveillance supplement in the Communicable Disease Report during the winter months. The widespread outbreaks due to the H₁N₁ virus strain in 1977–8 showed the need for more adequate measures of influenza in children and to meet this need CDSC and the Medical Officers of Schools Association are conducting studies of reporting clinical illness in school children. Surveillance of other respiratory virus diseases was continued and of these

respiratory syncytial virus infection was of interest because in 1978/79 the expected annual outbreak was larger and took place later than usual. The experience gained by this laboratory based surveillance of respiratory virus disease enabled CDSC to contribute to the investigation of a large outbreak of respiratory virus disease in children in Naples during the winter of 1978/79.²²

Rubella and whooping cough

Two childhood infectious diseases of particular importance in England and Wales in 1977–9 were rubella and whooping cough. More comprehensive surveillance of rubella was achieved by bringing together laboratory reports, general practitioner reports, notifications in five cities, abortion data and reports of congenital rubella to the National Congenital Rubella Surveillance scheme.^{23,24} These data demonstrated a large outbreak of rubella in 1978 which was unevenly distributed throughout the country and which continued in 1979. The largest outbreak of whooping cough for 20 years took place in England and Wales during 1977–9 following a substantial decline in acceptance rates for immunization. The main data used for surveillance were clinical notifications but by comparing these with laboratory reports it was possible to show that the outbreak was due to *Bordetella pertussis* predominantly of type 1, 3.

Legionnaires' disease

The surveillance of Legionnaires' disease began after the identification of the first cases in England and Wales in Nottingham, in August and September 1977. Since this time over 200 cases have been reported by laboratories most of which were investigated by CDSC epidemiologists.²⁵ The cases showed a seasonal incidence with a peak in the late summer, all were in adults, about one-third over 60 years, about two-thirds of the cases were in males and many had a medical history of predisposing disease or were heavy smokers. Two possible small common source outbreaks were demonstrated. About one-quarter of the cases acquired the infection abroad, most often in holiday resorts in the Mediterranean. No person-to-person spread was observed in any of the incidents investigated.

Tuberculosis

Surveillance was based mainly on statutory notifications, of which there were about 10 000 each year in England and Wales. Although the Mycobacterium Reference Unit of PHLS maintained a drug resistance register little other use of laboratory data was made. To determine the value of laboratory data and to explore the possibility of integrating clinical and laboratory reports, CDSC is cooperating with the Medical Research Council in a study of notified tuberculosis. CDSC specialist community physicians took part in the investigation of two outbreaks of tuberculosis, one was in a school for children aged 5–9 years in which 56 (26 per cent) of 211 pupils were found to be tuberculin-positive, Heaf test grade 4. Thirty-five developed clinical disease or had radiological signs. The source was a teacher with pulmonary tuberculosis, sputum smear-positive. The other outbreak was amongst children aged 8–12 years who attended a swimming bath at which an attendant was found to have extensive bilateral pulmonary tuberculosis with sputum smear-positive. Over 3500 children were screened, 16 developed symptoms or had radiological signs and altogether 184 children had positive tuberculin tests, Tine grades 1 to 4.

Sexually transmitted disease

CDSC commenced studies on the surveillance of sexually transmitted diseases in England and Wales which had been based on quarterly clinical reports from special clinics since their

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