

The Bradford smallpox outbreak in 1962: a personal account

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Today it is fervently hoped that outbreaks of smallpox such as that which occurred in Bradford in 1962 will never arise again. However, it is unwise to be sure of 'never'. In 1962, just after I was appointed consultant pathologist in Bradford, isolated cases had been reported in England, but these were amongst people from South East Asia who had recently arrived in the UK. The Bradford outbreak had several unusual features, particularly the events leading up to its discovery.¹ Since I am one of the declining number of persons still alive who were heavily involved in the outbreak I am persuaded that my experiences at the time are worth recording.

BACKGROUND

The first intimation of a possible outbreak was on 25 December 1961 when a 24-year-old man who had arrived at Heathrow Airport, London, was suspected of having smallpox. This was confirmed on 10 January 1962. Another suspected case was reported of a man who had arrived from Pakistan on 19 December. A contact of the first case arrived in Bradford on 1 January and was immediately isolated, but remained symptom-free. A further man from Pakistan who developed suspicious symptoms was isolated, and was later discovered to have chickenpox. In view of these cases it was decided locally to put a hospital which had been designated for possible cases of smallpox in a state of readiness should an outbreak occur.

THE OUTBREAK

On 11 January 1962 a patient was admitted to the local fever hospital with pyrexia of unknown origin (PUO). Although the patient was a Bradfordian—in fact a cook at the Children's Hospital—the possibility of smallpox crossed the minds of the clinicians. They sent a sample of blood to the Haematology Department at St Luke's Hospital (their local laboratory) simply stating PUO. It showed a mild anaemia, leucopenia, thrombocytopenia and a striking blood film with nucleated red cells, myelocytes, fragmenting granulocytes and vacuolation of the protoplasm, condensed nuclear bodies and atypical plasma cells and some Türck

cells. Obviously this was a severe virus infection and the patient was terminally ill.

The same day a blood specimen was received from a male patient in our own hospital (St Luke's). This was from a 40-year-old Bradfordian who had been admitted with a history of severe fever, headaches and unexplained thrombocytopenia; meningitis had been suspected. He died shortly after the blood was taken and before a clinical diagnosis had been obtained. In fact a post mortem was being performed while the blood film was being examined. To my astonishment the blood count and film was almost identical to that of the fever hospital patient (case 1).

I showed the films to my haematology colleague at Bradford Royal Infirmary and he shared my concern that there were two cases of severe virus infection in two separate hospitals. We consulted textbooks old and new, and an old haematology book stated that these changes could occur in smallpox. We later ascertained that these blood changes had been reported in 1925.²

I telephoned the consultant at the fever hospital and told him that his patient, the cook at the Children's Hospital, had blood changes indicating an overwhelming virus infection, and almost apologetically stated that these changes had been described in smallpox. There was a pregnant pause at the other end of the phone: 'You may well be right'. I then told him, 'It looks as if there is another case here at St Luke's—a 40-year-old Bradfordian who as far as I know has never been abroad.' He stated that he would come over immediately to view our patient in the mortuary. On arrival he immediately examined the flexures of the man's arm and saw the petechiae often present in fulminating smallpox. We realized that we were faced with a potentially catastrophic smallpox epidemic.

Our immediate difficulty was that we would not be able to obtain laboratory confirmation of smallpox for at least 48 hours. At that time electron microscopy had not been established to obtain a speedy laboratory diagnosis. Specimens from the two deceased were dispatched by taxi to the local Public Health Laboratory where Dr B P Marmion, the virologist (now resident in Adelaide, Australia), tested the samples by, I believe, complement fixation and egg culture. A quickly convened 'council of war' was held by the regional medical officer, the chief medical officer of Bradford and his deputy, the regional

infectious diseases consultant and myself. Other clinicians, hospital administrators, senior nurses and public health officers were added later when required. Our first decision was to assume that the clinical diagnosis of smallpox was correct and this group was given total power to act.

SOURCE OF THE OUTBREAK

What was the source of the outbreak? The cook was employed at the Children's Hospital and it was quickly discovered that the St Luke's patient (case 2) had a child who had been a patient in the Children's Hospital. An immediate investigation of patients in the Children's Hospital revealed that six small children were displaying spots, the classic early signs of smallpox. One child who had been transferred to a convalescent hospital (Wharfedale) showed similar early signs of the disease.

On the following day it became apparent that the source of the outbreak was a child from Pakistan who had been admitted to the Children's Hospital with a fever after arriving by air from Karachi on 16 December. She was thought to have malaria, and *Plasmodium vivax* parasites were said to have been found in her blood film. At first she responded to treatment but the fever returned and she died on 30 December. Death was attributed to staphylococcal septicaemia and a post mortem was performed at Bradford Royal Infirmary. The pathologist found no reason to doubt the clinical diagnosis. When I told him of our discoveries and that the Pakistani child had almost certainly had smallpox, he admitted that he had never been vaccinated. He became ill that evening and although receiving primary vaccination he died a few days later of confluent smallpox.

IMMEDIATE ACTION

Every hospital in the city—St Luke's, Bradford Royal, the Children's Hospital and the fever hospital—and a convalescent hospital outside Bradford was 'infected'. The delay in diagnosis of the condition meant that it could easily have spread outside the hospitals. The isolation hospital at Oakwell was immediately staffed and the number of beds was increased. All cases were transferred to that hospital, plus a nurse at the Children's Hospital who had been diagnosed as chickenpox but later shown to have smallpox. Mercifully she recovered. At first all hospitals were closed until the situation could be assessed, and the outlying hospitals were requested to receive urgent admissions which would normally have been referred to Bradford hospitals.

The first major task was to isolate, examine and vaccinate all immediate contacts of infected persons. The size of this operation is illustrated by the fact that the patient in St Luke's (case 2), although dying within 48 hours of admission, had over 200 close contacts. Incidentally, his immediate family, who had nursed him at home before

hospital admission, never showed any evidence of being infected. Unfortunately I have no information on their vaccination history at that time.

This major task of tracing, vaccinating and placing under surveillance of all possible contacts was immediately introduced: 285 000 persons were vaccinated and well over a thousand contacts were traced in the first five days after the discovery of the outbreak. One person, usually a hospital pathologist, was designated control-of-infection officer in each hospital. I was given the task of looking after St Luke's.

The Pakistani child had apparently been vaccinated in infancy and revaccinated along with her father and mother in December 1961, but there was no satisfactory evidence that the vaccine had 'taken'. The cook (case 1) and the St Luke's patient (case 2) had no history of a previous vaccination.

My tasks were clearly defined and were: (1) to act as medical liaison between the hospital and medical officers of health both locally and nationally; (2) to undertake and organize surveillance of immediate contacts including examination of their vaccination reaction and arranging revaccinations where necessary; (3) to arrange for the examination of contacts who became ill and to obtain specialist advice where necessary; (4) to institute and supervise the measures necessary to isolate the ward block into which patient 2 had been admitted and to prevent the spread of infection from there.

I moved into the hospital and was forced to refuse requests from resident doctors to leave the premises. This was a shock to my wife who was expecting our second child and had never been vaccinated. She was vaccinated locally as was our elder son. Such was the alarm at the time that when she telephoned our local paediatrician in Pontefract to ask if she could come to the hospital to have her vaccination site inspected, his immediate reply was 'Don't come to the hospital. I will see you at home'.

All immediate contacts of the patient were examined unclothed, in a separate ward emptied for this purpose, and their temperatures were taken twice daily. This could have been an embarrassment for the female staff involved but no objections were ever made. I had an isolated incident where a junior doctor left the hospital without permission and travelled to Manchester to see a consultant in his private rooms. When he announced that he had come from St Luke's Bradford the waiting room quickly cleared, much to the consultant's annoyance. A nurse went by train to visit a friend, a fellow nurse in a London hospital, and was 'locked' in her room for 2 weeks. One hospital attempted to revoke the appointment of a nurse or doctor because he or she was employed at St Luke's. A tramp arrived in a Scottish town proudly stating that he had been a patient at St Luke's: this caused great consternation throughout the town.

Table 1 Bradford smallpox cases, 1962

Primary	Secondary	Tertiary
5-year-old girl arrived from Karachi 19 December— <i>died</i>	1) 18-year-old nurse at Children's Hospital— <i>recovered</i> 2) 37-year-old pathologist— <i>died</i> 3) Case 2, 40 years, admitted to St Luke's, PUO & thrombocytopenia— <i>died</i>	Man, aged 77, bed adjacent to case 2— <i>survived</i> Man, aged 63, bed adjacent to case 2— <i>died</i> , death attributed to cerebral thrombosis
	4) Case 1, cook at the Children's Hospital— <i>died</i> <i>Children's Hospital cases</i>	
	5) Boy, 3 years— <i>died</i>	Boy, age 12, in Wharfedale Hospital, contact with case 10— <i>survived</i>
	6) Boy, 7 years— <i>survived</i> 7) Girl, 3 years— <i>survived</i> 8) Boy, 2 years— <i>died</i> 9) Girl, 2 years— <i>survived</i>	
	10) Girl, 3 years, transferred to Wharfedale Hospital— <i>survived</i>	

Part of my task, and in many ways the most difficult, was dealing with the press. The national press was often irresponsible, printing such headlines as 'City in Fear!' 'Keep Out Pakistanis', but the local press, particularly the *Telegraph & Argus*, was helpful and reported accurately the local position which was of 'refusal to panic'. The attitude of the national press has been described by Butterworth.³

Luckily our tough measures were successful and although 6 of the 12 persons who developed smallpox died only 3 were tertiary cases. There were two contacts of case 2 in the hospital and although they contracted smallpox one survived and the other died mainly because of the serious condition necessitating his admission to hospital (Table 1). Luckily no further cases were reported and by mid-February the all-clear was given.

COMPLICATIONS OF VACCINATION

Unfortunately smallpox vaccination does have unpleasant side-effects, ranging from transient fever and local discomfort to fatal encephalitis. In 1960 in England and Wales 408 699 persons received primary vaccination, 8 developed encephalitis and 3 died. In the Bradford outbreak where 280 000 were vaccinated (either primary or secondary) many experienced minor symptoms and at least 6 (4 adults and 2 children aged three months) had symptoms severe enough to require hospital admission. Only one of these died, a man aged 49, and his death was probably due to associated medical conditions. Unfortunately 3 children died after clinical diagnosis of post-vaccinal encephalitis, although the post mortems in each

case showed only cerebral oedema and congestion and the pathologist could only go as far as to conclude 'cerebral congestion following vaccination'. One of the three was of considerable interest. The child, aged 1½ years, had not been vaccinated because of an infected nappy rash, but had been bathed with her sister who had been vaccinated. She developed multiple skin lesions from which vaccinia virus was subsequently recovered at post mortem. The brain showed congestion.

CONCLUSION

This was a dramatic and in many ways unique outbreak of smallpox, a condition that I had never expected to encounter. I had been trained as a general pathologist with basic experience in all branches of the subject including bacteriology. Today the normal practice is to be trained in one discipline only—e.g. as a clinical haematologist. My overwhelming memories of this outbreak were the diligence, enthusiasm and above all the sheer professionalism of the public health doctors, clinicians, nurses and administrators who successfully prevented a potentially calamitous smallpox outbreak. This 'success' was due primarily to the fact that a small group of regional and local doctors, nurses and administrators had the authority and drive to introduce immediate measures to tackle the outbreak, to set in motion exhaustive tracing of contacts, and to initiate ring local mass vaccination. Thus in a month the outbreak could be declared over.

A lesson to be learned from this outbreak is that, if ever a smallpox epidemic arose again, it might well present itself

to the clinicians not as a textbook case but as PUO as in the Bradford outbreak or as a haematological disorder or some masking disease.

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