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FEATURE

RISK COMMUNICATION

Watching the detectives: tracking the source of Europe's latest *E coli* outbreak

David Payne examines the response to the recent deadly outbreak of *E coli* in Germany

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"It was like a crime thriller where you have to find the bad guy," said Helmut Tschiersky-Schoeneburg, head of Germany's consumer protection agency after hearing the likely source of the country's *Escherichia coli* outbreak.

Last week the death toll rose to 39 as the outbreak, linked to contaminated bean sprouts from an organic farm in the northern state of Lower Saxony, claimed its first child—a 2 year old boy.

By then 3235 people had been infected with the 0104 strain, most of them in Germany. More than 780 people have developed haemolytic-uraemic syndrome (HUS), which can lead to kidney failure. Unusually, most of the cases are in adults aged between 16 and 60. Those most at risk of developing HUS are normally the under 5s and over 60s.

On the trail

The number of cases has been much lower since 10 June, when bean sprouts were identified as the likely cause after three case-control studies by Berlin's Robert Koch Institute, the federal body responsible for disease control and prevention in Germany.

The breakthrough was the institute's "restaurant recipe cohort study" of five groups of diners (112 in total), including 19 with enterohaemorrhagic *E coli* (EHEC) infection who had dined at the same place.

Each was asked what they had eaten. Kitchen staff were questioned. One group, a travel club, had taken pictures. Some showed the dishes they had ordered.

Customers who had eaten bean sprouts (perhaps unknowingly) had an 8.6-fold increased risk (95% confidence interval 1.5 to 8) of EHEC/HUS illness compared with those who did not. All of the ill people had eaten bean sprouts.

David Risling, Associated Press's Berlin correspondent, hailed the breakthrough as "simple detective work trumping science after a month of searching and testing thousands of vegetables."

It was this last study[1] that finally gave the all clear to Spanish cucumbers, salad, and tomatoes, which had been originally identified by the Lower Saxony state agriculture department as the source of the outbreak.

The alarm was first sounded on 19 May, when Hamburg's chief medical officer asked the Koch Institute to investigate three cases in children.

As other cases emerged in north Germany over the next 24 hours the investigation team conducted a preliminary epidemiological assessment, followed by more detailed case-control studies, to explain the growing number of cases.

Epidemiological analysis showed that those affected consumed raw tomatoes, cucumbers, and lettuce significantly more often than healthy study participants.

Gérard Krause, one of the institute's investigators, said: "There were a number of things that were unusual. It wasn't a paediatric outbreak at all.

"There turned out to be a lot of adult female cases, and they were rather well educated, very food conscious people.

"It gave us a very good idea of what people had eaten. There were the usual suspects—milk, meat, bean sprouts, but we concluded it was most likely to be raw vegetable products, although we couldn't at that stage narrow it down."

In the UK, the epidemiological investigation was overseen by the Health Protection Agency. Dilys Morgan, the agency's head of gastrointestinal, zoonotic, and emerging infections, said: "The first thing that hit us was the European early warning response system alert sent out on Sunday 22 May, saying there had been 30 cases of HUS in Germany.

"We didn't believe it, to start with. Had they got it right? To get 30 with many adult females is exceptional. We tried to contact the Koch Institute to tell them we were also having an [unrelated] VTEC (verotoxin producing) outbreak in the UK, but we didn't hear from them, presumably because they were so busy. They were in an unenviable position."

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Communication problems

On Tuesday 24 May the BBC reported 80 cases of EHEC ingestion in Germany in advance of a European alert confirming this figure and stating that the likely foodborne source was unknown.

Did the country's federal structure slow down the risk communication process? Germany's mass market *Bild* newspaper described "chaos on killer germs." News magazine *Der Spiegel* asked why Germany lacks the early warning systems of other developed countries such as Japan and the US.[2]

Hugh Pennington, emeritus professor of bacteriology at the University of Aberdeen, who led inquiries into the 1996 *E coli* 0157 outbreak in Lanarkshire, Scotland, and the 2005 outbreak in south Wales, thinks the federal structure may have contributed.

He said: "How quick were they to identify this outbreak? Did their local and federal system work?

"In Germany, they have had a lot of STEC [shigatoxinogenic *E coli*] cases over the years, but I wonder if they were taken by surprise? Their systems are working well now, but were they well oiled enough at the beginning?"

Professor Pennington also questions Germany's focus on HUS. Had the communication also asked people if they had experienced bloody diarrhoea, there might have been more notifications earlier, he said.

Echoing the conclusions drawn in a recent *Lancet* editorial that described communication as "haphazard at best, dismal at worst,"[3] he added: "I think the Germans do have something to learn about communication. There were lots of government messages going out.

"In Hamburg there was the agricultural minister for Lower Saxony. Another agricultural minister in the east talked about cucumbers in a rubbish dump.

"In the UK we usually have a single well briefed authoritative person, someone the public can trust, not lots of different voices." However, even this can go awry, he said, as happened with swine flu. "England ran into some problems when the chief medical officer described a worst case scenario of 50 000 cases by tea time."

The US Centers for Disease Control, he believes, did a better job as the lead agency by choosing its assistant surgeon general Anne Schuchat.

"When she wanted to make an important point, she'd wear a vice admiral's uniform. She did a lot of press conferences, and if she didn't know the answer she'd say so."

Dr Krause defends Germany's approach, which was to release regular joint statements from the Koch Institute, the Federal Office of Consumer Protection and Food Safety (BVL), and the Federal Institute for Risk Assessment (BFE).

He said: "In any large government structure there is a subdivision of duties and mandates, even in centralised countries. There are hierarchies and structures. We have two dimensions of separation and duties.

"I'm not sure that having one authoritative person would simply make things better. Different specialties have different things to communicate. A chief medical officer may be too authoritative.

"If official agencies communicate in a conservative way it creates a media vacuum which is quickly filled by a doctor with too much time or too little information on his hands."

Dr Krause points to the inevitable delays in identifying cases to the local health department. "Cases of HUS are notifiable, and this should happen within 24 hours. But patients don't see their physician straightaway, and the physician doesn't get a microbiological test done straightaway. So yes there are delays."

In an ideal world, there would be a central database and a more automated notification process: "For example, the local health department could see names and have access to the dataset. But the public health people would have limited access, without names and addresses.

"I worked in the US for a number of years. They invested millions of dollars in a system. They still do not have it working. Perhaps some smaller countries that do not have such a sensitive history of data confidentiality could have such a system."

Nevertheless, Dr Morgan commends the Koch Institute for releasing the first case-control study, which identified lettuce, tomato, and cucumbers as possible causes, within days of the first cases coming to light. It involved a team of 15 interviewers working in the areas where people then in intensive care lived. "To get a case-control study done so quickly is pretty impressive," she said.

Professor Pennington defends the scientific process of building up the crucial evidence.

"With the Lanarkshire and South Wales public inquiries we looked in great detail at how the public health people had done their detective work. We were lucky in Scotland because there was a jug of leftover gravy.

"You have a nasty bug, you need to find the source and cut it off. Speed is of the essence, and the German authorities did manage to rule out meat very early on because they had appropriate controls. The cucumbers did have a virulent *E coli* on them, so it was quite a reasonable assumption to make.

People were eating the bean sprouts without being aware of it. They needed to do the more detailed study, looking at menus, what people had bought, photos of the food. And of course when they did that, lo and behold, everything became clearer."

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1 Robert Koch Institute. Information update on EHEC. Recipe based restaurant cohort study. 2011. www.rki.de/cln_109/nn_217400/EN/Home/PM082011.html.
2 Evans S. E coli outbreak: cries of "chaos!" at crisis handling. *BBC News* 2011 Jun7. www.bbc.co.uk/news/world-europe-13682708.
3 Responding to disease outbreaks in Europe. *Lancet* 2011;377:1978.

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