In this Chemical Incident Report the Chemical Incident Response Service (CIRS) highlights the following for public health professionals and staff working in accident and emergency departments:

- **Cluster** management and investigation remains a topical and problematic issue for health professionals. Five cluster studies are presented highlighting some of the issues found in cluster identification and response. Many receive wide local and occasionally national publicity. A summary of some of the British and European resources to assist with investigating clusters is included.

- **Integrated Pollution Prevention and Control** is proving a challenging regime for Health Authorities to comply with as statutory consultees. CIRS is actively encouraging the concept of a scoping study between all its health authorities in order to clarify the work programme.

- **The petrol crisis** in Autumn 2000 fuelled controversy and provided the events leading to this reported incident.

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CLUSTERS

Introduction
Virginia Murray CIRS
At the CIRS Cluster training day in December 2000 a series of excellent presentations prompted my request for summaries from the presenters and others for publication in the Chemical Incident Report (CIR). I am very grateful to the authors. These clusters demonstrate some of the problems reported in health authority responses. Some have considerable publicity attached to them such as the congenital upper limb deformity in Corby and the cancer cluster in a primary school in Rotherham. Some clusters are identified from local case reports, such as the red tattoo pigment reactions and some are found by routine surveillance, such as the talipes in North and East Devon. Finally a report of a well documented cluster is presented where toxicological cause & effect were described in the eosinophilia myalgia syndrome.

Congenital Upper Limb Reduction Deformities in Northamptonshire
Dr. Chamion Olivier, Specialist Registrar in Public Health, Northamptonshire Health Authority

Background
An article was published in The Sunday Times of April 11 1999 indicating a possible cluster of hand and finger anomalies in children living close to a landfill site in Corby, Northamptonshire. Boundaries were drawn tightly in time and space around the four cases reported in the article. This led to an onslaught of phone calls to the Health Authority from parents, concerned residents and the media. There were also other underlying agendas at that time. For example, Corby Council and East Northants Council agreed to the development of a motor racing track on a landfill site. The local residents mounted a very strong campaign against it, on the grounds that the land was contaminated and a danger to the public. In addition, there was a police investigation into alleged corruption regarding the handling of contracts for cleaning of contaminated land prior to factory and housing development in Corby.

Investigation
The aim was to determine whether or not there was a statistically significant excess in cases of Congenital Upper Limb Reduction Deformities (CLRD) within the area under investigation.

Active case finding was undertaken using various sources. All cases identified had their diagnosis confirmed by a consultant geneticist. To avoid the problem of ‘Texas Sharp Shooting’, i.e. drawing boundaries too tightly in time and space around cases once you have already suspected that a cluster may have occurred, the geographical and temporal boundaries...
included the northern half of the county over the ten-year period 1989-1998. The number of cases recorded in the ONS database was approximately half those ascertained via active case finding.

**Results**
The birth incidence rates of CLRD in Corby and the rest of the Northern half of Northamptonshire were calculated and then compared with those for England and Wales using ONS data. The birth incidence rates were then compared with other rates for similar regions using data from EUROCAT and other studies. The only significant finding was that the standardised ratio for the area under investigation was significantly lower than the rates for England and Wales. There was a higher proportion of cases in Corby when compared with the whole of the Northern part of the county. This however, was not statistically significant.

**Media and Public Relations**
A press meeting was convened to discuss the investigation and the findings with the local media. The health authority also held a public meeting with the concerned parents to discuss the report.

**Lessons learned**
There is substantial under-reporting of congenital anomalies to the Office of National Statistics and under the present system it may not be possible to identify potential problems early.

There is considerable public concern about the potential harmful effects to health of living close to landfill sites. The risk associated with living next to these sites needs to be communicated sensitively and openly with the concerned public.

**Recommendations**
The results of this study indicated that the level of reporting to the ONS could be as low as 50% in some instances. This illustrates the need for an improved system of reporting of congenital anomalies throughout the country. A more comprehensive and user friendly system of data reporting and collection is needed in the county and efforts are presently being made to establish a countywide register of congenital anomalies.

**Update**
On February 1 2001, solicitors for some of the affected families in Corby declared that they had prepared writs on behalf of several of the affected children and have embarked upon a legal battle against the council to prove that their children’s disabilities are linked to toxic waste.

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**National congenital anomaly surveillance: talipes investigation and other ‘anomalies’**
*Dr Mark Kealy Consultant in Communicable Disease Control, North and East Devon Health Authority*

**Introduction**
The National Congenital Anomaly System (NCAS) is a national system run as part of the Office of National Statistics (ONS) (see pages 13-15). Anomaly notifications are received from NHS trusts on the SD56 form. Information held relates to live-births and stillbirths only, not abortions. The possibility of further information being contributed from local regional congenital anomaly registers exists. The creation of disability and other registers at district level has probably raised awareness of potentially disabling conditions which could potentially increase ascertainment of such conditions.

**The system in action**
Objectives of NCAS:
- to identify increased notification levels nationally and locally
- to estimate the prevalence of congenital anomalies
- to contribute to international studies
- to aid national and local service planning

In order to allow early investigation of possible clusters, the system automatically runs monthly, quarterly and yearly comparisons based on comparisons with the previous years notifications from the same health authority. However, no national comparator is offered with confidence intervals to help in assessing the likely significance of any increase. Possible suggested reasons for higher reporting of a particular anomaly are:
- a recent increase in reporting following a period of under reporting
- a change in local diagnostic procedures
- notification of a case more than once
- a real increase in prevalence

Locally the system has drawn attention to higher than expected numbers of anomalies in ‘congenital cardiac or great vessel anomalies’ and ‘Limbs’ (table 1).

**Table 1: Higher than expected numbers of anomalies for North and East Devon**

<table>
<thead>
<tr>
<th>Code</th>
<th>Anomaly name</th>
<th>June 98</th>
<th>June 99</th>
<th>June 00</th>
</tr>
</thead>
<tbody>
<tr>
<td>3G</td>
<td>Other congenital cardiac or great vessel anomaly</td>
<td>2</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>D</td>
<td>Cardiovascular system</td>
<td>3</td>
<td>8</td>
<td>23</td>
</tr>
<tr>
<td>G</td>
<td>Limbs</td>
<td>17</td>
<td>24</td>
<td>37</td>
</tr>
</tbody>
</table>
It should be made clear that 3G is a subset of D. Closer examination of the classification shows that there have been increases within the above categories particularly for 'patent ductus arteriosus' and 'deformities of feet' (table 2). Within the deformities of feet category these were found to be largely talipes. 3E is a subset of 3G and 6C a subset of G.

<table>
<thead>
<tr>
<th>Code</th>
<th>Anomaly name</th>
<th>12 months ending</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>June 98</td>
</tr>
<tr>
<td>3E</td>
<td>Patent ductus arteriosus</td>
<td>0</td>
</tr>
<tr>
<td>6C</td>
<td>Deformities of feet</td>
<td>3</td>
</tr>
</tbody>
</table>

The suggested average national incidence of talipes is 1 per 1000 births, North and East Devon has about 5000 births per year, so roughly 5 cases per year would be expected. Clearly the observed numbers are well in excess of what might have been expected. However, the term talipes in this context is not defined, although it is likely to refer to a bilateral fixed deformity.

Suggested action following identification of a higher than expected number of anomalies is as follows:
- is this the first surveillance warning for this anomaly group?
- ensure that there is uniformity in the cases found, and adopt a case definition
- case finding
- is the increase in cases sudden or gradual and sustained?
- has local reporting changed?
- have other or neighbouring health authorities seen similar increases?
- do the cases reported have a potentially similar aetiology?

The health authority has been receiving surveillance warnings about talipes since early 1999. Examination of the cases of talipes by a scientist from CIRS to see whether the cases were likely to share a common aetiology revealed both a lack of essential information given by the notifier as to whether the case of talipes was fixed or positional or unilateral or bilateral. Bilateral talipes might be thought to be more likely to be due to a teratogen than unilateral.

Out of a total of 21 cases examined, spanning a period from 1996-1999, 6 were recorded as bilateral and 4 as unilateral, and 11 were unspecified. In terms of whether the deformity was fixed or positional, 2 cases were recorded as fixed, and 1 as positional, 18 were not specified. In ten cases no information was given on either fixity or whether the deformity was unilateral or bilateral. All but one of these unspecified cases occurred in 1999, which at that time had contributed 14 cases to the total of 21.

It can be deduced from the above that the increase in cases has been sudden, occurring in 1999 and continuing into 2000. The sudden increase, combined with the lack of specificity of the diagnosis is suggestive of a change in local reporting, with marginal cases being reported.

An enquiry has been made to the NCAS to see if neighbouring authorities have observed similar increases, we are also seeking to identify the people who made the notifications. However, in terms of national trends, the NCAS in its guide has a graphical representation of the number of babies notified to the system and the number of cases of talipes is included, this appears to have been dropping slowly since 1990 nationally, perhaps suggesting a local problem.

**Possible aetiology?**
Looking at aetiology, both CIRS and our SHO conducted literature searches on possible environmental influences on the incidence of talipes with the following results;
- attempted abortion
- early amniocentesis/amniotic rupture/constriction bands syndrome
- aerial spraying with 2,4,5-Trichlorophenoxyacetic acid
- possibly excess alcohol?
- maternal zoster?
- maternal smoking?
- anticonvulsant drugs?

Of the above, the environmental agent of most interest is aerial spraying with herbicide, apparently the parent chemical was contaminated with 2,3,7,8- tetrachlorodibenzo-p-dioxin (TCDD) which was the constituent most likely to be responsible. Spraying took place between 1960 and 1977 in this New Zealand study. Aerial spraying however, is not used in Devon, and dioxin based chemicals are no longer in use.

**Current Conclusion**
Initial examination of postcodes does not suggest obvious clustering and cases are spread through urban and rural areas, although a rigorous examination of attack rates for meaningful population groups has not been undertaken.
A ‘cancer cluster’ in a primary school
Dr Kevin Perrett, Consultant in Communicable Disease Control, Rotherham Health Authority

Summary
This article describes a ‘cancer cluster’ that caused local media interest and parental concern in a primary school in Rotherham. Two cases of different cancers and a third case of aplastic anaemia all occurred in children who attended the same small primary school within a three month period in 2000. No specific links between the cases was found. The article argues that a purely scientific approach could potentially hinder the resolution of a cluster problem as the scientific approach, whilst undoubtedly important, can divert attention from the need for effective risk communication with the community concerned.

The problem
Without warning on a Friday morning, I was contacted by a school for advice following the publication of a front-page story in the local weekly paper. Based upon the concerns apparently expressed by one family (and without discussion with the Department of Public Health), a story with the headline ‘Cancer Probe Demand’ had appeared.

Preliminary investigation the same day revealed that within a preceding three month period there had been three children taken seriously ill in the same primary school of approximately 250 pupils: a seven year old boy with Hodgkin’s lymphoma; a three year boy with Ewing’s sarcoma of the leg; and a six year old boy who had been diagnosed with a serious illness possibly due to cancer (though within a few days the diagnosis of aplastic anaemia had been made).

Concerns were heightened because a ‘toxic waste dump’ had been sited approximately half a mile from the school. It was decided that an investigation, led by the Department of Public Health, was required (although, from the outset, it was suspected that this was a chance occurrence).

The investigation
As the cluster was prima-facie an extremely unusual occurrence there was not felt to be any merit in a formal statistical analysis. The situation was discussed with the relevant hospital specialists who had been aware of the cases and the connection between them. They had informally discussed the situation and agreed that a common cause was unlikely. No formal case conference was however held. The Chemical Incident Response Service (CIRS) was contacted for advice and, in particular, assisted in a review of the relevant literature. This was primarily aimed at clarifying the known aetiology of the three diseases involved. A search for other cases was conducted through the regional Cancer Registry and other data sources; none were discovered.

The history of the ‘toxic waste dump’ was reviewed. This had been a waste recycling plant and incinerator, which had been the subject of considerable concern and publicity locally during the early 1990s. A campaign office had been set up with a local GP as a leading member of the campaign. The main concern had been the import of copper hydroxide waste sludge from the USA. The plant, along with the waste chemicals in question, had however been closed prior to the birth of two of the three children involved.

Exposure histories of the children were taken from their mothers by the CCDC. As no suitable questionnaire could be obtained a simple pro-forma was drawn up. No common exposures or links between the children, other than attendance at the same school and that they all lived in the same area, were discovered.

Discussion of investigation
The situation, in particular information gathered by the literature search, was discussed with the CIRS. This conversation proved quite complex and confusing. On reflection, this was because it was difficult to reconcile the questions posed by parents at the school with the scientific approach to the problem taken by the CIRS.

The CIRS approach is, quite appropriately, based on the source-pathway-receptor model. Considering the cluster in this way: the source was purely speculative; no pathway could be identified; and the receptor ‘target group’ may not have been meaningful but in fact a chance phenomenon. In contrast, the lay perception appeared to be that: the target group was a given; reassurance was needed regarding a possible source; and that no specific consideration was given as to a pathway. The CCDC was ‘caught in the middle’ of these two contrasting ways of approaching the problem and concluded that a scientific approach had important limitations and could not ‘solve’ the problem.

Risk communication
It remained the role of the health authority however to address legitimate public concerns by providing as scientific an answer as possible. This is difficult in reality. The skill is in identifying clear cut and accurate facts that can be put to the local community in an open and straightforward manner.
This skill of risk communication is the key to resolving cluster investigations which are, usually, as in this incident, generated by lay concerns, which may not be accurate and are very unlikely to be scientific. Nonetheless these views may be strongly held and do have to be answered. In this incident an early response was made to say 'we will investigate'. This gives a vital message that the problem is being taken seriously. To not take this early step would be likely to inflame public concern and does not necessarily involve a commitment to a lengthy or detailed investigation.

A clear line of communication with the school was established at the very outset and, as the investigation proceeded, increasing emphasis was placed on identifying the right 'messages' to put across to the local community. After an investigation lasting two weeks, a letter was sent to all parents at the school giving the following facts:

- that these were three very different diseases
- that only two of the three cases were due to cancer
- two of the children were born after the waste recycling plant closed
- no other cases had been found
- no other possible environmental causes were identified
- the reassuring view of hospital specialists was given
- the assistance of experts in reviewing the scientific literature was explained

The overall aim was to use all these facts to offer a message of reassurance - primarily that the cluster was a 'tragic coincidence'. The CCDC also stated that he believed 'it is extremely unlikely' that another such case would occur in the school. Clearly such a view cannot be proven but was reasonable and defensible based on the facts.

Letting as many relevant people as possible know the full facts of the situation (the local media usually report only part of the information they receive in a press release) is important and will help to counter rumours. This was done by distributing the letter for parents to all those who might have an interest, ranging from the local GPs to the local MP.

Conclusions
Clusters are one of the 'heartsink patients' of public health practice. Experience shows that investigations of clusters rarely produce a positive result. They are also rarely motivated by the concerns of public health professionals. Rather they are normally generated by public concerns and therefore risk communication is key to successful response.

A cluster of red tattoo pigment reactions
Dr Margaret Meltzer Specialist Registrar in Public Health Medicine, North Thames, on secondment to CIRS, now Consultant in Communicable Disease Control Hillingdon Health Authority

Summary
On Tuesday 10 October 2000 an e-mail from the CCDC e-group alerted CIRS to a problem with red tattoo pigment. Several tattooists in the south of England were aware of unusual severe skin reactions to red pigment which had been observed since March 2000. Initially the pigment was reported to be from a single manufacturer and thought to be widely distributed in England.

Sentinel case
In July 2000 a patient presented to a GP with a severe skin reaction confined to the red area of a tattoo. The affected area of the tattoo was severely infected and had sloughed and ulcerated; the lesion was unresponsive to antibiotics and the GP referred the patient to a plastic surgeon for an expert opinion. The GP then reported the adverse reaction to the local Environmental Health Officer (EHO) on 24 August 2000.

The investigating EHO was able to obtain the suspected pigment from the tattooist and submitted it to the Public Analyst for chemical analysis on 1 Septem-
ber. Analysis was as follows:

- Lead 5.8 mg/kg
- Chromium 4.3 mg/kg (may cause skin ulceration)
- Copper 1.8 mg/kg
- Zinc 1.2 mg/kg
- Nickel 0.6 mg/kg
- Cadmium >0.1 mg/kg
- Qualitative: magnesium, aluminium, titanium, iron, strontium, molybdenum and barium

In the absence of existing standards and safety levels these results were inconclusive as no meaningful interpretation could be made.

**Investigation**

Information gained anecdotally from tattooists suggested that about 4000 are practicing in the UK. About one million tattoos are performed annually, 70-80% of which contain red tattoo dyes.

CIRS sought advice from a consultant dermatologist at St John’s Hospital for Skin Diseases, Guy’s and St Thomas’ Hospital Trust. He advised that tattoo reactions to heavy metals were relatively common in the 1960s to 1970s. More recently suspicion has fallen on the use of clothing dyes in tattoo pigments. The absence of European legislation covering standards of tattoo inks was especially highlighted.

A few GPs and one consultant dermatologist had also reported several cases to their local EHOs and/or CCDC. Photographs of some of the affected cases were obtained (figures 1, 2 and 3). Reactions were described as severe and chronic, occurring between 2-12 weeks post-tattooing. The affected areas were inflamed, swollen, raised, itchy, scaly, with scabbing and occasionally ulceration. Late scarring occurred in some lesions, usually after several months. Some patients may require plastic surgery.

Problems identified in the investigation

- No particular causative substance had been identified
- The reaction is idiosyncratic, illustrated anecdotally by an account where two women were tattooed only minutes apart with the same design by the same tattooist using the same batch of red pigment; one client developed a skin reaction while the other did not.

The advice of the British Dermatology Association was sought. They have sent a questionnaire to all consultant dermatologists to try and estimate the frequency and severity of adverse events arising from tattoos. This survey will also assess if these adverse health effects have been associated with any specific pigments. Results of this survey are awaited.

**Discussion**

A simple classification of the medical complications of tattooing suggested by Scutt includes transmission of infection, reactions to trauma and reactions to pigments. The most common metals implicated in pigment reactions are mercury (red), chromium (green), cadmium (yellow), and cobalt (blue). The majority of reactions associated with red, blue, green and yellow tattoo dyes are granulomatous but lichenoid, and occasionally, other reactions also occur. Yellow and red dyes are also associated with photosensitivity reactions.

Reactions to red tattoo dyes are the most frequently reported. The reactions have been ascribed to mercury hypersensitivity, notably, cinnabar (mercuric sulphide) and the reactions may be delayed between a half to sixteen years later. Reactions to mercury on patch testing are variable and many of the case reports remark on the negative skin patch tests in those patients tested for allergy to heavy metals. More re-
recently red pigments causing adverse reactions in tattoos have been identified as aromatic azo-compounds and linear quinacridone. Histopathological reactions to these compounds showed a lichenoid reaction in the dermis or just perivascular lymphocytic infiltration. While epicutaneous patch testing with the tattoo pigments was negative, it was suggested that intradermal injection, as in tattooing, may produce allergic reactions.¹³

All tattoo sites become inflamed reactively from the punctures and deposition of pigment, with temporary erythema, oedema and crusting, but this is short-lived. Severe pyogenic infections are now infrequent with improved antisepsis. Nevertheless occasional cases of septicemia occur. Risk of blood-borne infection in tattooing is an inherent risk. Transmission of syphilis, tuberculosis, leprosy, hepatitis B and C are described in the literature reviewed ¹⁴,¹⁵,¹⁶,¹⁷,¹⁸,¹⁹,²⁰,²¹. Although HIV may potentially be transmitted no unequivocal cases have been reported²¹,²².

**Conclusions:**
People may voluntarily expose themselves to a procedure which involves potential risk to their health. Public health messages about risk associated with tattooing should be made more explicit and targeted at appropriate groups so that they are empowered to make informed decisions about those risks.

**References**
Eosinophilia Myalgia Syndrome, 1989, United States

Erica Lovelace, MSc Toxicology Student, University of Surrey

Introduction:
During the autumn of 1989 in the United States, an epidemic of Eosinophilia Myalgia Syndrome (EMS) resulted in over 1500 affected individuals and over 30 deaths.

Although the outbreak started in the autumn, it took sometime before the cluster of individual cases and symptoms were identified as EMS. By 6 December 1989 the Centre for Disease Control, Atlanta, had received reports of EMS cases from 21 States. The only link between these individuals and their symptoms was that 98% shared histories of L-tryptophan ingestion preceding the onset of symptoms.

This epidemic was strongly linked to, if not defined by, the ingestion of contaminants of a product prepared as a dietary supplement containing L-tryptophan, which was imported from Japan. This L-tryptophan was used for a variety of problems such as depression, overeating, migraine, pain sensitivity and stress.

Contaminants:
Investigations into the manufacturing process at the Japanese company, Showa Denko KK, disclosed plant modifications between 1986 and 1989 that had failed to remove impurities in bulk L-tryptophan that became available in the marketplace. These contaminants found included:

- **Contaminant Peak E:** Peak E was found using high-performance liquid chromatography tests and was later analysed to have the structure of 1,1'-ethylidenebis(tryptophan) or EBT. In *in vitro* studies, EBT stimulated type I collagen mRNA levels produced by human fibroblasts and it was suggested that this contaminant may lead to the development of EMS. In addition, peak E has been illustrated to increase human dermal fibroblast DNA and collagen synthesis up to 4-fold in a dose dependent manner.

- **Contaminant Peak UV-5:** In 1991, another trace contaminant, Peak UV-5 (also termed PAA), was detected. Measurable quantities of PAA were found in the contaminated stock.

- **Other possible contaminants:** over 17 different other contaminants have been implicated.

It was also found that in the month before onset of EMS, patients with EMS consumed significantly greater quantities of PAA and EBT than did control subjects.

It is debatable if tryptophan itself can cause inflammatory responses that either initiate, worsen, or make the patient more susceptible to the symptoms of EMS. For instance it was illustrated that even non-implicated tryptophan could induce skin thickening. Although tryptophan may contribute to some of the scarring and inflammatory features of EMS, it was found that only the impure L-tryptophan had consistently illustrated more of the severe characteristics featured by this illness, thereby inferring that L-Tryptophan itself is unlikely to cause the disease.

Proposed Mechanism of Toxicity:
Peak UV-5 was selected to investigate the possible mechanisms for the EMS-linked toxicity. Through amino acid analogue replacement, the findings suggested that EBT substituted for L-tryptophan and created fully functional, amino acid analogues rather than causing premature termination or significant slowing of nascent protein chains.

The mechanism by which the inflammation develops into the disease known as EMS is not known. It is known that eosinophil degranulation occurs in the tissues, but it is not known whether this is a cause or a marker for the disease. It is suggested in chronic EMS that there is a continuing stimulus to activate a constant immunological response, but it is also not known what might be acting as this persistent stimulus.

Numbers exposed
No exact numbers of the total number of people exposed to the contaminated L-Tryptophan have been reported.

Dose ingested
Since L-Tryptophan was a dietary supplement in the 1980s and did not need a prescription to purchase, patients ingested between 500 to 15,000 mg per day with a duration of use reported to be between 2 weeks to 15 years.

Symptoms and signs reported included:

- myopathy and neuropathy (i.e. severe myalgias, cramps, fatigue, parasthesias, sensory loss and motor difficulties),
- CNS abnormalities such as encephalopathy, seizures, and spasticity,
- scleroderma-like rash of the skin,
- thromboembolic events of the veins,
- pneumonia,
- interstitial disease,
- hypertension, and
- perivasuclar inflammation (increased macrophage
population).

**Prognosis**

In 60% of cases a slow resolution over years of myalgias, skin changes and residual weakness was found. Deaths were reported in 2% of cases, particularly in those under 18 months of age and older patients (i.e. the elderly) who were particularly susceptible to the overwhelming symptoms of this disease.

**Epidemiology**

The only common link between patients was the consumption of the contaminated L-Tryptophan in late 1989 and early 1990. In a study of 418 users two risk factors for EMS were found. (greater than 4000 mg/day) and age, but no association with sex, race or use of other medications was found.

**Control**

On March 22, 1990, the Food and Drug Administration (FDA) banned the public sale of the dietary supplement L-Tryptophan. Today, L-Tryptophan is regulated by the FDA as a drug and remains banned as a food additive.

**References:**


**Acknowledgement**

CIRS is grateful to Dr Julie Howarth from the University of Surrey for providing this and other reports by the MSc Toxicology students.

**Clusters: Sources of information and advice**

**Introduction**

Virginia Murray, Director and Rico Euripidou, Environmental Epidemiologist, CIRS

This section of the Chemical Incident Report includes reports on cluster sources of information and advice and systems for investigation from some of the presenters at our Clusters Training Day, December 2000. These include the work of

- the Small Area Health Statistics Unit
- the National Congenital Anomaly System
- EUROCAT (Additional material)
- The Health and Safety Executive

Information on the Environment Agency databases that may be of use to health authorities in investigating these events is also included. CIRS proposes to add further summaries from other organisations, such as Cancer Registries, in future editions of the Chemical Incident Report.

A ‘Clusters’ chapter forms part of the material prepared for the CIRS Chemical Incident Management for Public Health Physicians handbook. From reports from those who have used this approach, it would appear that this, along with David Irwin’s algorithm, provides a useful initial tool to provide conceptual response to cluster enquiries.

Since 1998, CIRS has received only 12 reports from health authorities about clusters enquiries. However anecdotal reports suggest that there may be more enquiries that are in fact received by health authorities and that these are handled locally. In order to try and assess the impact of this work on health authorities CIRS would be happy to document any enquiries about possible clusters on our surveillance system for easier investigation and documentation.

**Reference**


**Cluster investigation and the Small Area Health Statistics Unit**

Dr Paul Aylin, Clinical Senior Lecturer in Epidemiology and Public Health, Small Area Health Statistics Unit, Imperial College School of Medicine, London, UK. p.aylin@ic.ac.uk, Tel: +44 (20) 7594 3334

**What is a cluster?**

A cluster is defined in the Oxford English Dictionary
Health professionals investigate clusters to improve our understanding of disease aetiology. Examples of cluster investigations include a number of cases of myeloid leukaemia among hatters noticed by an astute haematologist in Istanbul. This was determined to be due to heavy use of benzene as a cleaning fluid. A further cluster investigation was brought about by a report by the mukhtar (chief) of a village in Turkey of many early deaths from cancer, which led to the confirmation of high incidence of mesothelioma due to naturally occurring mineral fibre erionite. An example of a temporal cluster was the dramatic increase in adenocarcinoma of the vagina in young women in the 1970s, due to exposure in utero to diethylstilboestrol, widely prescribed in the 1950’s to prevent spontaneous abortion.

There are problems with cluster investigation and rarely is a clear cause found for them. The Centre for Disease Control in Atlanta investigated 108 cancer clusters over 22 years but found no clear cause for any of them and the Minnesota State Department of Health investigated 410 reported disease clusters, of which only 5 progressed to detailed epidemiological studies. Not one of 141 requests of cluster investigation in Wisconsin required in-depth studies. Given that investigation of clusters is of questionable scientific value and poor yield, we recommend only investigating clusters of cases which are rare or suddenly increasing in frequency. There is little merit in testing vague hypothesis “does it cluster” and efforts are best spent on examining specific hypotheses.

Management of a cluster

Public health professionals are usually well placed to respond to reports of disease clusters. The response may include a variety of measures including establishing good rapport with the concerned parties, defining the cluster precisely both clinically and in time and space, identifying potential sources of environmental pollution causing concern and liaising with other statutory agencies (see box). Apparent disease clusters can cause substantial public anxiety and media interest and need to be handled effectively.

A component of the response is to establish if the observed numbers for the apparent cluster are greater than would be expected based on the population at risk and on a reference set of disease probabilities. Determining the number of observed cases involves obtaining data on disease events over the study period, which may be several years. The calculation of the expected number of events must account for known risk factors that may include age, sex and socio-economic deprivation. A relative risk can then be calculated by dividing the observed number by the expected. If a raised risk is found, it will need to be placed in context e.g. the risk of a specific disease in a small area may be higher than expected when compared to the reference region, but may be lower than that in many other similar areas in the region.

Small Area Health Statistics Unit

The Small Area Health Statistics Unit (SAHSU) was set up to undertake work concerned with the assessment of the risk to the health of the population from environmental factors with particular reference to the interpretation of routine health statistics. Another remit is to undertake quick investigation and advise on reports (formal and informal) of unusual clusters of disease, particularly in the neighbourhood of industrial installations. SAHSU is part of Imperial College and has strong ties with the Centre for Environmental Technology within the TH Huxley School of Environment, Earth Sciences and Engineering. It also has links with bodies such as the Environment Agency, the Water Research Centre and the Chemical Incident Response Service from which data on specific exposures are obtained.

SAHSU holds national cause-specific data on deaths (currently 1981-99), on births (1981-99), on cancers from the national cancer registry (1974-95), on hospital admissions (1992-99), and on congenital anomalies (1983-99), using the postcode of residence to locate cases to within 10-100 metres. There are approximately 1.4 million residential postcodes in use in the UK containing, on average, 17 households each. SAHSU also holds a range of geographical, socio-economic and environmental data, all of which are geographically referenced. Using in-house data-
bases, statistics and geographical information systems technology and expertise, these datasets are integrated, analysed and displayed. To assist us in our remit to quickly advise on reports of unusual clusters, we have developed a Rapid Inquiry Facility. This facility can provide observed and expected counts for any disease/end point held on the database, for specified age and year ranges, for any geographical area (based on Electoral Districts) in the UK. It can also provide context maps of the study area and an automatically generated report including results, interpretation and limitations.

**Discussion**

The source data for the facility is supplied from routinely collected national data, therefore factors such as diagnostic and geographical completeness, accuracy and timeliness, need to be considered. Mortality data are known to suffer from inaccuracy of caus-specific diagnosis particularly in the elderly. The completeness of cancer registration may vary from registry to registry, from cause to cause and over time. Under-registration may be non-random, especially at the local level. At least two sources of potential bias are present in using hospital data for this type of epidemiological study: firstly there are differences between admissions policies and coding practices between different provider units, and secondly there are differing referral policies between GPs. The local expertise of the public health department will be valuable in determining the extent to which these factors are likely to be operating in a particular area. Further work is needed to investigate the extent to which such local factors affect estimates of risk.

One of the major problems with cluster investigation is the choice of boundaries used to define a cluster. Often a group of cases is identified prior to defining spatial or temporal boundaries. When boundaries are then drawn to include these cases, the denominator population is also included within these boundaries. The tighter the boundaries around the cluster, the higher the risk will be relative to a comparison population. This has been described as the ‘Texas sharpshooter’ effect, whereby a sharpshooter first empties his gun into a barn door and then draws a target around the bullet holes. As a way to minimise the effect of boundary shrinkage the Rapid Inquiry Facility routinely uses a priori standard ‘near’ and ‘far’ bands of 0-2 km and 2-7.5 km surrounding a putative cluster of cases around a point source. Although arbitrary, the bands have been used in earlier SAHSU studies and in general, achieve a useful compromise between population size and proximity to the point source. The way in which areas are initially grouped into concentric circles around point sources is however, simplistic and may not be the best representation of exposure around emission sources. Further analysis incorporating prevailing winds or utilising pollution monitoring data or atmospheric dispersion modelling helps to define groups of areas according to pollution concentrations. This may provide a better estimate of the geographical exposure patterns surrounding such point sources.

Many point sources of pollution are located in deprived areas. Although the effect of deprivation on health can be adjusted for using standardisation, the possibility of residual confounding remains. There may be additional sources of pollution close to the study area, which may also contribute to an increased relative risk of disease. Again, local knowledge can be useful in interpreting the estimates provided by the analysis. An additional problem is the accuracy to which postcodes are mapped to Electoral Districts. This may affect the deprivation score assigned to a health event and the calculation of the relative risk.

Further problems occur in estimating the population at risk. The population data upon which the summary risk estimates are based are subject to inaccuracies since they arise from the Census. The Census provides only a snapshot view of the population every 10 years and may not reflect population changes between censuses. The 1991 census was most notably subject to the problem of under-enumeration which could inflate risk estimates especially at younger ages. We address this latter problem by using the adjusted 1991 census counts from the 'Estimating with Confidence' project. Small area level populations for non-census years are then calculated as follows: an initial estimate of the population in each Electoral District is made for the years between 1981 and 1991, by interpolating between the two censuses, whereas for years after 1991, the 1991 populations are used. These initial estimates are then rescaled in proportion to the annual local authority district populations.

It is important to recognise that the Rapid Inquiry Facility is only part of the scientific investigation of clusters. The facility for rapidly producing maps and analyses will only be offered to departments of public health medicine, where careful consideration by a local public health specialist will be essential in interpretation and presentation of the findings.

**References**

2. Baris YI, Simonato L, Saracci R, Winkelman R. The epidemic of respiratory cancer associated with erionite fibres in


National Congenital Anomaly System

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The National Congenital Anomaly System (NCAS) is run by the Office for National Statistics (ONS). The system records congenital anomalies notified for live and stillbirths in England and Wales. I present here a brief overview of the system and its potential to be used as part of follow up investigations after exposure to toxins (see box).

History

The collection and notification of information on congenital anomalies on a national basis was proposed by the Chief Medical Officer in 1963 in the wake of the Thalidomide epidemic, which affected an estimated 5000 victims world-wide. Research has suggested that with present systems in place this epidemic might have been detected within 2 weeks if as little as 2% of pregnancies had been exposed. By setting up systems to register congenital anomalies and monitor the frequencies of specific anomalies, it was hoped that any new epidemic of birth defects would be detected much earlier. Hence, the main function of NCAS is surveillance.

Sources of information

Most of the notifications received by NCAS come from local community trusts and health authorities. When an anomaly is identified at birth the midwife completes details on the birth notification. From this information an SD56 form is completed by the Health Authority. Notifications to NCAS can be made at any time, not just at birth.

Uses of NCAS data

The data obtained from the notifications to NCAS are put to a number of uses:

- There are sometimes public concerns that toxins from a specific site or location may have an effect on developing foetuses. Testing these hypotheses or investigating identified clusters requires data at a small geographical area. In the past NCAS data have been used to help allay media driven fears, but better quality and more complete data could reduce the need for separate and intensive studies.

- Government and Health departments use the information to evaluate and monitor the impact of changing and new policy on prenatal screening, immunisation policies (e.g. rubella), and health education campaigns (e.g. folic acid).

- The data is also useful for predicting need and planning services. Health Authorities increasingly need to know the absolute number of surviving disabled people in the areas they cover. This requires the available data to be as complete as possible for those still surviving.

How surveillance works

Many of the major anomalies can be identified at birth and in these cases an SD56 form should be completed by the Community Trust or Health Authority to send to ONS each month as part of our surveillance programme. Every month, quarter and year notifications for each health authority are run through the national system since abortions were not legalised until 1967, after the national system was set up. However, ONS process abortion notifications on behalf of the Department of Health and abortion information is frequently included in their non-surveillance analyses.

Problems with data

Although the main purpose of the National Congenital Anomaly System is surveillance, it also provides the best national data on prevalence. It has long been recognised that there is under reporting in the system so the ONS has embarked on a programme of improving the level of reporting.
The coverage of National and Regional Congenital Anomaly Registers in the British Isles, boundaries as at 1st April 2000.
The Regional Registers
Since 1998 information has been provided for Wales by the National Congenital Anomaly Register (CARIS) and by the Trent Congenital Anomalies Register (CAR). From January 2000 the North Thames West Congenital Malformation Register and the Merseyside and Cheshire Congenital Anomaly Register have provided data also. These registers obtain details of cases from a wide variety of sources and therefore have a more complete notification including all births in Wales and 23% of births in England. Regional registers use multi-source ascertainment i.e. they pick up cases when children visit paediatrics/specialists which means that conditions less likely to be diagnosed at birth such as heart anomalies are more likely to be notified in areas with registrars. The figure opposite shows the coverage of the national and regional congenital anomaly registers for the British Isles for April 1 2000.

The essential role of notifiers
The National Congenital Anomaly System relies on the voluntary efforts of a large number of health service staff. No additional resources are provided for the Health Authorities to supply the data, and for those notifying this is an additional part of their existing work. It is a tribute to the dedication of these staff that notification has continued throughout major changes in the organisation of the NHS.

If you would like further information on the National Congenital Anomaly System or receive a free copy of our guide for data users and suppliers please contact Ruth Yates, Room B6/10, Office for National Statistics, Drummond Gate, London SW1V 2QQ. 020 7533 5202. ruth.yates@ons.gov.uk

EUROCAT: European Surveillance of congenital anomalies
Helen Dolk, EUROCAT Project Leader, Professor of Epidemiology and Health Services Research, University of Ulster, United Kingdom. Email eurocat@lshtm.ac.uk

What is EUROCAT?
EUROCAT is a European network of population-based registries for the epidemiologic surveillance of congenital anomalies. EUROCAT started in 1979. Currently, more than 900,000 births per year in Europe are surveyed by 36 registries in 17 countries of Europe. The Central Registry holds a standardised database on more than 160,000 cases of congenital anomaly among livebirths, stillbirths & terminations of pregnancy since 1980 which is updated every year.

<table>
<thead>
<tr>
<th>Objectives of EUROCAT</th>
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<tr>
<td>to provide essential epidemiologic information on congenital anomalies in Europe</td>
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<td>to facilitate early warning of teratogenic exposures</td>
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<tr>
<td>to evaluate effectiveness of primary prevention</td>
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<td>to assess the impact of developments in prenatal screening</td>
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<td>to act as an information and resource centre for the population, health professionals and managers regarding clusters or exposures or risk factors of concern</td>
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<tr>
<td>to provide a ready collaborative network and infrastructure for research related to the causes and prevention of congenital anomalies and the treatment and care of affected children.</td>
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<td>to act as a catalyst for the setting up of registries throughout Europe collecting comparable, standardised data.</td>
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Why register congenital anomalies?
There are two main reasons why congenital anomaly registers are established:
1. to facilitate the identification of teratogenic exposures. Ever since thalidomide and rubella were discovered as powerful teratogens, registries have been set up to facilitate research and surveillance concerning environmental causes of congenital anomalies, and to give early warning of new teratogenic exposures. Registers are also used for genetic studies, and increasingly for research into the interaction of genetic and environmental factors in causing congenital anomalies.
2. for the planning and evaluation of health services. This includes primary prevention strategies such as periconceptional folic acid supplementation to prevent neural tube defects, so-called “secondary prevention” by prenatal screening and diagnosis, and tertiary prevention through paediatric, rehabilitative and other services. Population-based registries are a particularly powerful tool for the evaluation of health services, because they represent the experience of an entire community, not the outcomes of specialist units which may serve only a selected group of women or children, or which may have atypical human or financial resources.

How can a register be used?
Whether concerned with the identification of teratogenic exposures, or with planning and evaluation of health services, or both, registers can be used in two main ways:
1. as a basis for surveillance using routinely collected data. Every register routinely collects a core
of standard information on each malformed child, and a core of information (often more limited) on non-malformed children in the population.

2. as a basis for special or ad-hoc studies, such as case-control studies, requiring further data collection. The presence of a register which has already done the work of identifying who in the population has a congenital anomaly, with details of diagnosis, can greatly facilitate the conduct of ad-hoc studies which seek to address specific hypotheses concerning teratogenic exposures or effectiveness of health services.

Principles of registry organisation

The following principles of registry organisation are recommended by EUROCAT:

1. Local availability of expertise in medical genetics, paediatrics, obstetrics, epidemiology. In order to collect high quality data, and to make maximum use of the data.

2. Coverage of a geographically defined resident population. A population-based registry avoids the possibility of selection bias when data collection is hospital-based, where high risk pregnancies may be selectively referred either to or away from the hospital, leading to higher or lower estimated prevalence rates than experienced by the general population.

3. Multiple sources of case-ascertainment. It is the experience of all registries that a number of different sources must be actively consulted to find all cases of congenital anomaly. These include birth certificates (if congenital anomalies are noted), hospital discharge summaries, paediatric, obstetric and medical genetics records, pathology labs and cytogenetic labs.

4. Registration of cases diagnosed after the neonatal period. Not all anomalies are obvious at birth, and accessing sources of information picking up newly diagnosed cases up to at least one year of age is recommended, especially for cardiac defects. These same sources of information may also be useful to verify diagnoses made at birth.

5. Registration of terminations of pregnancy after prenatal diagnosis of congenital anomaly. It is essential for both aetiologic and health service studies that all terminations of pregnancy are registered and included in research and surveillance.

6. ‘Local’ data collection, with national and international co-ordination and collaboration. Local knowledge of the health system, and personal contact and feedback to health professionals tend to be necessary for high case ascertainment and diagnostic detail. When a registry is too large, the local relevance and professional collaborations are lost, and data quality suffers.

The ideal size of the population to be covered by a registry depends on how the principles above can best be put into practice given the geography of the population and health services. The median size of EUROCAT registries was about 12,000 annual births in 1996 and the majority of registers cover less than 40,000 annual births.

Accurate case ascertainment (an accurate register of which children are malformed, and what their malformations are) has two elements: the quality and coverage of diagnostic services within the region, and the quality of the reporting mechanism to the register. The former includes the presence and uptake of a specialised fetal pathology service and a medical genetics service. Changes in screening and diagnostic practice can lead to apparent changes in the prevalence of some congenital anomalies, and underly for example increases in the reported prevalence of certain urogenital and cardiac anomalies. Accurate ascertainment is therefore a moving goalpost.

Why European collaboration?

Any consideration of European collaboration can be subtitled “the joys and frustrations of diversity”.

The added value of collaboration comes from:

- The opportunity for pooling of data: since specific congenital anomalies occur at a low frequency, pooling of data can give greater statistical power for investigations. For example, using the EUROCAT database (see below) analysis of gastroschisis (prevalence in the order of 1 per 10,000 births) showed that mothers less than 20 years old were eleven times more at risk of gastroschisis than older mothers, confirming similar reports from other populations and demonstrating a clear need for further investigation. Pooled baseline epidemiologic information on anophthalmia and microphthalmia (prevalence in the order of 1 per 10,000) was used to assess whether reported clusters of this condition in England were unusual, one example of the extensive use that has been made of EUROCAT data for baseline ‘expected’ prevalence rates. Ad-hoc studies have also benefited from pooling data. For example, multi-registry case control studies have investigated maternal occupation as a risk factor for congenital anomalies, focusing on solvent exposure, and the risk of congenital anomalies among residents near hazardous waste landfill sites.

- The opportunity for comparison of data: comparison of prevalence rates between regions can suggest potential aetiologic differences, potential differences in diagnostic methods or
health service variables, or potential data collection biases that need to be followed up. For example, comparisons of prevalence rates in different regions have demonstrated high rates of neural tube defects in the British Isles compared to continental Europe, slightly higher rates of omphalocele in the British Isles, and persistently high rates of cleft lip in Denmark and Netherlands. The total prevalence of Down Syndrome varies more than twofold in EUROCAT regions linked to differences in maternal age structure of the regional populations. EUROCAT surveys have shown major differences in prenatal screening policies and uptake between regions, as well as differences in the frequency with which prenatal diagnosis leads to termination of pregnancy. These factors are reflected in the frequency of termination of pregnancy for conditions such as anencephaly, spina bifida and Down Syndrome. In 1995-96, the only EUROCAT regions where termination of pregnancy was illegal were Ireland and Malta. In the other regions, 85% of all reported cases of anencephaly were terminations of pregnancy. In contrast, 47% of spina bifida cases were terminations of pregnancy, with a wide range from 13% (Northern Netherlands, Odense, Mainz) at the lower end to 89% (Paris) at the upper end. 63% of all cases of Down Syndrome to mothers over 35 were reported as terminations of pregnancy overall, with particularly high proportions in France and Spain (68 to 85%).

- **Facilitation of sharing of expertise.** A network of people who communicate regularly and understand the similarities and differences between regions can easily form collaborative groups for research studies, some of which I have already mentioned. Moreover, the presence of a collaborative network means that research expertise in one region can be readily brought to bear on a much larger population throughout Europe, and a range of European specialist expertise can be brought to bear on concerns encountered in any one region. Furthermore, new members of the network can have the immediate advantage of the aggregate experience in order to design their registries and activities. EUROCAT has been developing a Cluster Assessment strategy and in the near future will be developing an advisory service for the investigation of clusters and environmental exposure incidents.

- **A joint approach to European public health questions.** Many environmental concerns are now transnational in nature, and it can be useful to approach them in a joint study. For example, following Chernobyl, a joint analysis of the impact on the prevalence of congenital anomalies in Western Europe was made. Increasingly, it is expected that European legislation in a range of areas from waste management to transport should be subject to ‘health impact assessment’, including where appropriate the impact on reproductive and child health. Drug marketing also requires joint European pharmacovigilance, and EUROCAT contributes to this both through surveillance of congenital anomalies over time, and through assessments of drug-birth defect relationships, for example investigations of synthetic retinoids used for skin conditions.

The frustrations of European collaboration are connected to the never ending pursuit of data standardisation, to compare and pool like with like across regions. As described above, case ascertainment is dependent on both the diagnostic services in the region, and the quality of reporting of information to the register, so standardisation of data is a complex, though very revealing, endeavour.

**How does EUROCAT function?**

EUROCAT registries collect standard data about the baby (e.g. live or stillbirth or induced abortion, birth-weight, singleton or multiple) the diagnosis (syndrome and up to eight malformations can be coded, as well as family history) and the mother (age, occupation, drug exposures and illnesses, previous reproductive history). A common coding system is used, and a standard computer data entry programme is available. There is a standard list of anomalies for exclusion, mainly minor anomalies with little or no medical or functional importance. Although there is a standard questionnaire, only a core set of variables is universally collected by all registries to a high standard, concentrating on data concerning diagnosis.

Each year, the regional registries send a (electronic) data file to the EUROCAT Central Registry which collates the pooled database. The Central Registry carries out data validation and surveillance, produces reports on the prevalence of congenital anomalies in EUROCAT regions. Ensures effective communication between EUROCAT members, and between EUROCAT and other organisations, and disseminates information. The EUROCAT Central Registry also responds to reports of new teratogens emanating from outside EUROCAT, using either the database or the ready collaborative network. At present the Central Registry is based jointly at the University of Ulster and London School of Hygiene and Tropical Medicine.
Registry leaders meet annually to discuss issues concerning data validation and standardisation, surveillance methods and results, and research projects. Four Working Groups concern Statistics and Surveillance, Management of Clusters and Environmental Exposure Incidents, Communication and Validation, and Research. These Working Groups include both registry leaders and staff, and other relevant experts in Europe. A Project Management Committee of elected EUROCAT registry leaders as well as Chairs of Working Groups meets regularly. A Scientific Board has been constituted to advise EUROCAT on strategic scientific issues.

Researchers who are not members of EUROCAT can have access to the EUROCAT database if they submit a protocol describing their research project, which is considered by the Project Management Committee.

Acknowledgements

The EUROCAT Project is funded by the European Commission, most recently through the Rare Diseases Programme.

For further information (including a publications list), consult the EUROCAT website at www.lshtm.ac.uk/php/eeu/eurocat

References


The role of the Health and Safety Executive and its Employment Medical Advisory Service in the investigation of clusters

Dr AJ Morris, Employment Medical Adviser, Health and Safety Executive

The Health Safety Commission and Executive lie within the Department of Environment, Transport and the Regions. The Employment Medical Advisory Service (EMAS) is part of the Health and Safety Executive (HSE). Responsibilities for health and safety matters in the workplace are divided between HSE and local authorities, for example HSE has responsibility for factories, railways and nuclear installations and local authorities have responsibility for offices, hotels, places of worship and entertainment.

There are seven HSE regions and each has a team of one Senior Medical Inspector, three Medical Inspectors and three Occupational Health Inspectors. Their role is wide involving primary inspection, investigation, supporting prosecutions, education and project work.

Investigating possible clusters with Consultants in Communicable Disease Control may involve outbreaks of communicable disease and non-infectious environmental hazards related to work activity on HSE premises. For example:

- outbreak of hepatitis B at an alternative medical centre
- construction work on contaminated land with alleged effects on residents.

The role of the CCDC is described as more immediate in terms of early diagnosis and treatment whereas the HSE role is that of obtaining information and evidence (statements, photographs, records) always with the possibility of a prosecution in mind. The role of the EMAS inspector was often that of facilitator between the two functions.

EMAS may also investigate suspected workplace cancer clusters. A recent investigation and subsequent prosecution involving the use of zinc and strontium chromate required an internal HSE investigation team of hygienists and toxicologists.

Closer links between CsCDC are urged and it is proposed that EMAS doctors will attend CCDC meetings to facilitate this if invited.

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THE ENVIRONMENT AGENCY: DATA, INFORMATION AND HEALTH
Steve Humphrey, National Project Manager for Human Health, Emma Hayes, R&D Project Manager for Human Health, The National Centre for Environmental Data and Surveillance, and Ron Thomas, Senior Database Scientist, Environment Agency

The Environment Agency, as a major environmental regulator in England and Wales, acts to regulate emissions and control pressures which may have an impact on the environment or on public
health. The Environment Agency’s Vision is to achieve “a healthy, rich and diverse environment in England and Wales, for present and future generations”.

The Environment Agency has a number of statutory duties which define its role in protecting human health. Some of these are outlined in the box below.

**Environmental legislation relating to human health**

- Environmental Protection Act 1990 (EPA 90) Part 1 - releases to be prevented, or minimised and rendered harmless. (s 7.-2(a)). “Harm” includes “harm to the health of living organisms” (s.1.-4).

- EPA 90 Part 2 - keeping, treatment or disposal of waste must not cause pollution of the environment or harm to human health. (s 33.-1(c)).

- Groundwater Directive - steps to be taken to avoid discharges that can “endanger human health or water supplies”.

- Environment Act 1995, s.57 - remediation of contaminated land - duty on the Agency to prevent, minimise, remedy or mitigate the effects of any significant harm from “special sites”. “Harm” is defined as “harm to the health of living organisms”.

- Integrated Pollution Prevention and Control (IPPC) Directive - releases from authorised

![Figure 2: the Environment Agency Pollution Inventory sites](image-url)
processes must not cause significant pollution, with pollution defined as releases “which may be harmful to human health”.

One of the main ways in which the Agency can ensure that it is acting to adequately protect human health is to forge good working relationships with public health professionals, and to make Agency data, and expert interpretation of those data, available to health professionals.

**Agency data of use to health professionals**

The Agency holds a large amount of data, some of which will be of direct relevance to the health profession, whilst other data are mainly of environmental significance.

The Environment Agency’s data includes – chemical or biological measurements in air, water or soils, the location of waste sites, and much more. Most Agency data are collected at specific locations e.g. the site of a landfill or industry, or a point downstream of a sewage outfall at which chemical concentrations, biology or other measures are determined for a specific date and time. Data are collected according to the Agency’s organisation – the eight Environment Agency Regions – which are divided along river catchment lines (Figure1). Much of the data use national grid coordinates as the geographical locator.

**Landfill sites**

There has been much concern about the public health implications of living close to landfill sites, and a wealth of epidemiological studies have looked at this problem. In order to fully assess these public health implications, good data are required on the landfill site location; size; amount and type of waste put into the landfill; emissions to air, land and water from the landfill; and the likely exposure of the local population to those emissions. The Environment Agency holds a nationally collated landfill database, which provides details of location and the category of wastes received by each landfill. In addition, the Agency is undertaking research to look at the emissions from landfills (chemical composition and amount of emissions), and ways of monitoring these emissions.

**Industrial sites (Figure 2)**

The Environment Agency regulates major industry in England and Wales. As part of the new IPPC legislation, Health Authorities are statutory consultees for authorisations which permit certain levels of emissions from industries. Data on the amounts and types of chemicals released to land, air or water each year from all Agency-regulated sites are held within the Environment Agency’s Pollution Inventory.

The Pollution Inventory:
- Releases of chemicals from Agency regulated major industries
- From 1998 onwards the dataset was standardised so that each industry now reports on the releases to air, land and water of up to 160 chemicals.
- Previously industries only reported on chemicals of importance to the industry in question, these data are also available.
- 2000 data will be available in June 2001
- The data on emissions from Pollution Inventory sites are available on the Environment Agency website in the ‘What’s in Your Backyard?’ section (http://146.101.4.38/wiyby/html/introduction.htm)

**Sewage works (Figure 3)**

The Environment Agency monitors the discharge downstream of sewage treatment works. Data that the Agency holds are:
- The location of sewage treatment works (STW), and the flow from the STW.
- Agency water quality monitoring data downstream of the sewage outflow (e.g. concentration of substances consented for discharge and compliance with standards for these substances).

**Bathing Waters (Figure 4)**

The Environment Agency monitors the quality of bathing waters in England and Wales as a duty under the Bathing Water Directive. At least 20 samples are taken at each of the 473 coastal and 9 inland designated bath-
ing waters during the bathing season. Sample points are selected to reflect the areas regularly used by the highest density of bathers. Monitoring is for faecal coliforms and total coliforms, faecal streptococci and, where necessary, salmonella and enterovirus. There are ‘mandatory’ and more stringent ‘guideline’ standards expressed as a set number of coliforms or streptococci per 100ml sample. Data on the level of compliance of bathing waters with these standards is available on the internet in the ‘What’s in Your Backyard?’ site (http://146.101.4.38/wiyby/html/introduction.htm).

Other Agency datasets
- Water quality data – fresh and marine water measurements of: pesticides, other organic chemicals, metals, BOD (biological oxygen demand), levels of nutrients and biota
- Areas at risk from flooding
- Groundwater protection zones
- Nitrate vulnerable zones
- Eutrophic sensitive areas


Use of data within the Agency
The Environment Agency uses the data it collects to monitor the state of the environment, to report on the state of the environment and to inform future decisions about environmental management. When an assessment of the state of the environment is made, the Agency often uses Geographic Information Systems (GIS) to provide a spatial dimension, and other data sources to put Agency data in context, or to augment the conclusions that can be drawn. For example, whilst the Agency collects data about the releases of chemicals to air from industrial sites, it is the DETR (via NETCEN) that monitors ambient air quality, and models air quality across the whole country. Comparing the data on urban and rural air quality with the releases from industry can give a picture of the degree to which industry contributes to air pollution in different locations for different pollutants. The Agency also holds data on sensitive natural areas such as Sites of Special Scientific Interest (SSSIs) and Areas of Outstanding Natural Beauty (AONB) – such data are of interest when considering issues such as the location of polluting industries, the levels of pesticide contamination or when looking at compliance with environmental standards.

Integration of health and environment data

Health and environment data can be integrated in a variety of ways. Using a GIS, various datasets can be combined – for example, the index of social deprivation by postcode or ward can be overlaid with the location of major industries in England and Wales. But caution is needed when integrating data in this way, as often the geographic extent of health and environmental data will not correspond, or the data will not correspond in the temporal dimension, making analysis difficult.

It is important when interpreting any dataset that relevant experts are consulted in order to avoid misunderstanding the nature and potential uses of the data. If environment and health experts can work together in this way it will ensure that the final outputs of studies looking at the impact of the environment on health will be more accurate, and more useful.

The Environment Agency and health

The prevention of harm to human health is an integral part of the overall approach to protection of the environment as exercised by the Environment Agency. Although the Agency is not expert in health matters, the public expects the Agency to be informed about the health impacts from the environmental pressures that it regulates and manages. In order to ensure that public health is adequately protected by the standards and limits imposed by the Agency, it is crucial that the Agency has good working relationships with health professionals and that it is kept informed of developments in the public health sciences.

An added benefit of the good working relationships which are being developed between the Agency and health organisations is the ability to share data, which will help in assessing the health impacts of environmental pressures.
INTEGRATED POLLUTION PREVENTION AND CONTROL

Introduction
Virginia Murray, Director, CIRS

This new piece of legislation provides an opportunity for health authorities in their Statutory Consultant role. The Chemical Incident Response Service (CIRS) has included in its Service Level Agreement to health authorities for 2001-2004 the need for toxicological support in assisting them in their role. However no specific guidance has been given to health authorities yet on how they are meant to respond. For this reason we enclose a legal view on the Regulations which reduces a document of over 100 pages to a summary to just two pages.

On 16 March 2001 CIRS hosted a meeting specifically on this topic and was very grateful to Professor Rod Griffiths, Regional Director of Public Health, West Midlands Region, for chairing the day. John Simpson comments on the meeting below. Following this and other meetings, CIRS and colleagues consider that there is a need for a scoping study for our six NHSE Regions and have invited representatives and observers to participate at this meeting. This meeting will be held on May 21 2001. I also include in this CIR a summary of the current IPPC support from CIRS to Health Authorities, April 2001

We will continue to update you on the process we develop in future Chemical Incident Reports. Please do not hesitate to contact me with any queries: tel 0207-771-5383, email: Virginia.Murray@gstt.sthames.nhs.uk

The Pollution Prevention and Control (England & Wales) Regulations 2000
Adrian Cooper, Barrister, 2 Harcourt Buildings, Temple, London EC4Y 9DB

2. The heart of IPPC is in regulation 9 (1): “No person shall operate an installation or mobile plant after the prescribed date...except under and to the extent authorised by a permit granted by the regulator.”

A number of those words requires explanation.

Installation and mobile plant
3. An installation is a stationary unit where one or more specified activities are carried out. Mobile plant is plant designed to be moved and used to carry out one or more specified activities.

Specified activities
4. These are listed in Part 1 of Schedule 1:
   1. Energy activities
   2. Production and processing of metals
   3. Mineral industries
   4.1 Organic chemicals
   4.2 Inorganic chemicals
   4.3 Chemical fertiliser production
   4.4 Plant health products and biocides
   4.5 Pharmaceutical production
   4.6 Explosive production
   4.7 Manufacturing activities involving carbon disulphide and ammonia
   4.8 The storage of chemicals in bulk
   5. Waste management
   6. Other.
5. Each activity is further broken down into Part A(1), Part A(2) and Part B according to its possible polluting effect. Within A(1), A(2) or B of each section the activities are described in detail.
6. References in the activities to the release of substances into the air and into water are to the substances listed in paragraphs 12 and 13 of Part 2 of Schedule 1.

The prescribed dates
7. The prescribed dates are in Schedule 3:
   - Existing Part A: Differing dates from 1st December 2000 to 2006 according to the activities in paragraph 4 above.
   - New Part B: 2002 to 2004
   - Existing Part B: The date when the determination of a permit is actually made.
8. Thus for new Part A installations and mobile plant IPPC has been in force since the beginning of the year.

The regulator
9. The regulator for Part A(1) installations and mobile plant is the Environment Agency and for Part A(2) and Part B installations and mobile plant the local authority.
10. Each regulator is required by regulation 8 to exercise its functions: “…for the purpose of achieving a high level of protection of the environment taken as a whole by, in particular, preventing or, where that is not practicable, reducing emissions into the air, water and land.”
Condition of permits

11. When determining the conditions of a permit under regulation 11 the regulator must take account of the following general principles.

Part A installations and mobile plant only

12. The installation or mobile plant should be operated so that:
   - waste production is avoided or where produced recovered or disposed of;
   - energy is used efficiently;
   - necessary measures are taken to prevent accidents and limit their consequences and upon cessation of activities necessary measures are taken to avoid any pollution risk and to return the site to a satisfactory state.

All installations and plant including Part A

13. All installations and mobile plant including those in Part A should be operated so that:
   - all appropriate preventative measures are taken against pollution through application of best available techniques; and
   - no significant pollution is caused.

14. “Best available techniques” means:
   “…the most effective and advanced stage in development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing…the basis for emission limit values designed to prevent and…to reduce emissions and the impact on the environment as a whole…”

15. Permits must include under regulation 12 emission limit values for pollutants, in particular those which are listed in Schedule 5, likely to be emitted from the installation or mobile plant in significant quantities.

16. Permits for a Part A installation or mobile plant must include conditions:
   - aimed at minimising long distance and trans-boundary pollution;
   - ensuring protection of the soil and ground water and appropriate management of waste;
   - relating to the periods when the installation or mobile plant is not operating where there is a risk that the environment may be adversely affected during such periods;
   - setting out the steps to be taken before operation of the installation or mobile plant and after cessation of operation;
   - setting out suitable emission monitoring requirements and specifying methodology, frequency and evaluation.

17. “Emission limit value” is defined as:
   “…the mass, expressed in terms of specific parameters, concentration or level of an emission, which may not be exceeded during one or more periods of time.”

18. Schedule 5 sets out a “list of main polluting substances to be taken into account if they are relevant for fixing emission limit values.”

19. The Environment Agency may give notice to a local authority regulator specifying emission limit values or conditions which it considers are appropriate to prevent or reduce emissions into water.

Determination of applications for a permit

20. At last we reach the role of the health authority. Part 2 of Schedule 4 contains the following:

   “9(1)… the regulator shall, within 14 days of receiving an application for a permit, give notice of the application, enclosing a copy of it, to the following persons:
   (a) in the case of an application for a permit to operate an installation or Part A mobile plant, the Health Authority in whose area the installation or mobile plant will be operated;”

   This applies to any installation, whether Part A(1) or (2) or Part B, but only to a Part A mobile plant:

   “12(1) Any representations made by any persons within the period allowed shall be considered by the regulator in determining the application.
   (2) For the purpose of sub-paragraph (1), the period allowed for making representations is:
   (a) in the case of any person to whom notice is given pursuant to paragraph 9… the period of 28 days beginning with the date on which notice is given…”

21. Other consultees under Paragraph 9 include, as examples only, the Food Standards Agency, the sewerage undertaker, the Nature Conservancy Council, where the application will be determined by the Environment Agency the local authority regulator in whose area the installation or mobile plant will be operated and where the application will be determined by a local authority regulator the Environment Agency.

The purpose of consulting the health authority

22. The regulator must take into account the health authority’s representations. These should assist the regulator to decide whether to grant a permit and if so what conditions and requirements it will contain so that the general principles in regulation 11 are complied with and it contains the specific requirements in regulation 12.

23. These permits will of course be tailored to the specific activity in Schedule 1, to its potential effect ie. Part A(1) or (2) or Part B and to possible pollutants, some of which are listed in Schedule 5.
24. No other consultee will have the knowledge or ability to consider the effects of the proposed activity on the health of the public or how to prevent or limit them.

25. The health authority will probably want to consider:
- the nature and quantity of any possible pollutants;
- the element, i.e. earth, air or water, into which they may or will be released and their effect on it;
- their effect on health;
- the level of safe emissions, for emission limit values;
- measures to prevent accidents and limit their consequences;
- the management of waste;
- remediation;
- methodology, frequency and evaluation of emission monitoring;

and any other consideration which seems relevant to the application. This is of course a lawyer’s list.

The Human Rights Act 1998
26. Article 2 of the European Convention on Human Rights states that:
   “Everyone’s right to life shall be protected by law.”

The European Court of Human Rights has frequently held that this places on public authorities, which include health authorities, a positive obligation to protect life. Although the Regulations do not expressly require health authorities to respond when consulted they are probably bound to do so. If, for instance, serious injury and death were caused by emissions from an installation, which could and would have been eliminated or reduced so as not to be harmful if a health authority had provided appropriate advice, it is possible to see that a claim could be brought against the health authority under sections 6 and 7 of the Human Rights Act 1998.

Conclusion
27. From a legal point of view IPPC provides a real opportunity to health authorities to maintain and improve the health of the public and the quality of the environment.

For the full IPPC Regulations: http://www.hmso.gov.uk/si/si2000/2001973.htm

CIRS Integrated Pollution Prevention and Control Meeting: 16 March 2001
Dr John Simpson, Regional Epidemiologist, CDSC South East

On Friday March 16th, CIRS held a meeting for Health Authority staff on the impact of the IPPC (Integrated Pollution Prevention and Control) legislation and what the inclusion of Health Authorities as statutory consultees would mean for them. The day was chaired by Professor Rod Griffiths, RDPH West Midlands Region. The speakers included Environment Agency staff who discussed the legislation and explained some of the technical data and processes, Pat Saunders head of the West Midlands Chemical Response service who discussed his units response, Fortune Ncube (CCDC West Surrey) who gave a talk on the effect an incinerator application had had on his work and life and Kate Ardern who gave a talk on Health Impact Assessment. The quality of the talks was very high indeed.

One of the most important aspects of the day was the ability to discuss with colleagues from the Environment Agency their perspectives on the legislation and how other statutory consultees e.g. Local Authorities and the Food Standards Agency relate to them. It became apparent that much more contact to understand each other’s abilities, problems and point of view would be beneficial. There was also considerable discussion about whether CsCDC were the most appropriate Health Authority staff to undertake these assessments and if they were what support they should need and expect. There was also discussion about ‘pro-formas’ for certain common processes e.g. paper mills, cement works and incinerators.

In this issue there is a longer discussion of how CIRS is hoping to approach IPPC for its contracted districts however the main points from the day were:
- IPPC will not go away and will be a significant workload for health authorities. There is a timescale for all present processes to be assessed by 2006 and also any new processes will need to be assessed. There will be serious workload implications.
- Health authorities will need to either contract for more support or directly employ trained staff. Professor Griffiths will be taking this to the Department of Health for funding consideration. Such support may fit best into a local or Regional context depending on the Region.
- Health Impact Assessment could be a very useful tool for major processes and training in its use should be made available.
- The Environment Agency are keen to liaise as fully as possible with health colleagues. The CsCDC in my Region and I have already met with our Regional counterparts.
- NHS re-organisation may cause problems with health consultation.

A very good day indeed, my only complaint: not enough coffee was provided!
Opinions garnered from the CIRS IPPC Training Day held on the 16th March highlighted various areas of concern. Whilst health authorities recognise they have a statutory duty to act as consultees, they perceive a need for a timely scoping study to clarify the work programme.

Need for a Scoping Study
1. There is an urgent need for a Scoping Study to agree the health authorities consultee role and responsibilities under IPPC. Clarification of the aims and objectives should include:
   - legal framework for health authority response
   - clarification of liability for health authority response
   - minimum and optimum data sets needed for a response
   - process and method of health impact assessment (if needed for a particular IPPC application)
   - clarification of the process of consultation and reply
   - identifying training needs and methods of acquiring the necessary skills to prepare the response
   - location of local expertise and capacity to undertake work be based particularly in view of possible organisational changes
   - support from the Environment Agency and local authorities to contribute to the response of health authorities
   - developing a system for collaborative working between health authorities for responses to similar industry applications e.g. cement works, incinerators and landfills
   - a system for audit of responses

2. A proposal to set up a working group for a scoping study has been considered. It requires representatives from the following organisations:
   - Regional representatives from each of the six English Regions served by CIRS - Regional Epidemiologists, CsCDC and/ or Observatories staff
   - Chemical Incident Response Service, with the Chemical Hazard Management and Research Centre, Birmingham, West Midlands Region invited as observers
   - Environment Agency
   - Food Standards Agency invited as observers
   - others

This group will meet on Monday May 21 2001, please contact VM if you would like information on your representatives

Current IPPC Support from CIRS to Health Authorities, April 2001
Dr Virginia Murray, Director CIRS

CIRS recognises that IPPC is an evolving process and is currently developing a pragmatic approach to assisting Health Authorities (HA) responding to these applications. CIRS will as far as possible undertake the following with your help:
- Please request a copy of the IPPC application to be forwarded to CIRS from your Regional Environment Agency (EA) Office or your Local Authority (CIRS does not consider that it is appropriate for HA staff to be responsible for extensive photocopying)
- After 2 working days, CIRS and HA to discuss the application and agree how CIRS can assist and clarify time scales for the CIRS part of the response process
- CIRS will endeavour to identify areas of insufficient information during the initial and more detailed assessment of the application
- CIRS will aim to provide an initial report within 14 days of receipt of application where possible in order to facilitate the HA response as the HA may need the toxicological information for their Health Impact Assessment, etc.

CIRS recommends the following to assist the HA with their response:
- CIRS recommends that the HA should not review food hazards and risks as the Food Standards Agency are tasked as Statutory Consultees to cover this area. If necessary consider including a comment to this effect in the HA responses.
- CIRS recommends noise should probably be best reviewed by the local authority. If necessary consider including a comment to this effect in the HA responses.
- CIRS recommends dispersion modelling to be checked by the EA along with air emission levels to ground - consider requesting the EA to provide a view on the data available as early as possible in the response timetable so CIRS can comment on these results
- CIRS recommends the responding HA to consider informing other local HAs at risk of potential pollution and identified by the dispersion modelling so that any additional comment can be included on potentially vulnerable populations

CIRS will endeavour to pass on best practice wherever it is identified as far as possible. The following
may be of help:
- Consider developing a local collaborative arrangement with local authority staff for applications received from the EA. Local authorities have been consultees on the Integrated Pollution Control legislation, which has now been superseded by IPPC, and therefore have some experience in this type of response process.
- Consider presenting all response to your Health Authority Board for review and ratification—this may encourage awareness of the volume of work required under the HA Statutory Consultee role and clarify the liability issue!

CIRS is considering the development of a HA/CIRS shared database to share data together. Advice from HAs on the value of this would be helpful. CIRS will be sending out a questionnaire to all its HAs to clarify who is the nominated officer for IPPC and how we will develop collaborative arrangements further.

Please contact CIRS if you have any comments on this work programme.

**Literature and Internet searches for CIRS and IPPC support**

**Helaina Checketts, Librarian, Medical Toxicology Unit**

**Search process**
- Searches for health authorities are done as soon as possible, usually within 2 working days, sooner if necessary. I need to know the exact chemical or process as soon as possible so that only appropriate material is offered to you.
- Searches follow a general pattern starting with a monograph from *Hazardous Substances Databank* or sections from *WHO/IPCS Environmental Health Criteria* or an *International Agency for Research on Cancer* monograph summary if appropriate.
- If a more definite question has been asked that isn’t answered by these sources or if a full literature search is needed, I will move on to *PubMed*, *Toxline*, and the *Environmental Protection Agency, Agency for Toxic Substances and Disease Registry, Major Hazard Incident Data Service Chemical Incident Response Center* if you require notification of previous comparable incidents.
- For material concerning legal requirements in the United Kingdom, I try *Open Government* on the net - probably Department of Health or Department of the Environment, Transport and the Regions.
- If it is a very rare or under-researched substance I use chemical ID sites and the websites of chemical companies. If necessary I try specialised sources such as the Civil Aviation Authority
- Sometimes it is clear that no precedent can easily be found, so it is necessary to contact other Poi- sons Centres throughout the world on "INTOX-GENERAL" our email list, and replies to this can take several days
- All this material may be accompanied by photocopies from relevant textbooks.

It is important to remember that the information retrieval process takes time. The first search may be swift, but often the material uncovered raises other questions and new searches need to be done. A few papers and reports will be on the net and can be accessed immediately, but many will have to be ordered from other libraries, and this can take from 24 hours to two weeks. Once this material is accessed, read and digested it may refer to other data which will have to be ordered in its turn.

**THE PETROL CRISIS**

*A petrol spill….*

*Emma Woodey, Environmental Research Engineer – Land, CIRS and Dr Arun Patel, Specialist Registrar, Public Health Medicine, Southern Derbyshire Health Authority*

**Background**

On 13th September 2000 at the height of the UK petrol ‘crisis’, an incident involving a leak of approximately 40-50 litres of unleaded petrol occurred. The event came to light after a resident reported a smell of petrol which had been present 12-18 hours previously to the fire brigade. On initial assessment the fire brigade considered there to be a potential fire and explosion hazard so immediate evacuation of the residents in surrounding properties was arranged. Properties were ventilated by the fire department with police taking charge of security issues. Although local newspapers reported the incident on the day following the event, the health authority was not notified of the incident until four days later.

**Incident investigation and management**

A taxi driver had stored unleaded petrol in plastic dustbin, a beer keg and a plastic cooking container on a concrete floor at the back of an empty private house in a busy residential area. The fuel in the bin melted the plastic and petrol seeped onto the floor. A fracture within the concrete floor provided an easy pathway for the petrol to migrate through to the soil beneath the property and neighbouring properties.
Air quality monitoring was carried out using equipment that measured only hydrocarbons and not individual compounds such as BTEX (benzene, toluene, ethylbenzene, xylene) for example. Varying levels of petroleum hydrocarbons were detected inside the properties with the maximum values reaching 2000 ppm. The fire brigade indicated that levels in excess of 8000 ppm would be considered a fire risk.

An emergency meeting called by the chief fire officer was held on the fifth day following the incident. Representatives from the police, fire brigade, local authority and health authority attended. Following the meeting, the housing and environmental departments of the city council took the lead in managing the incident. The health authority took responsibility for answering health concerns and questions from the residents as well as undertaking the assessment and monitoring of the health of those evacuated following the event. Whilst residents did not display any direct health effects due to acute exposure and no hospital or GP consultation took place as a result of the event, a base-line assessment of their health was carried out with a view to provide comparison for any possible future health concerns.

**Environmental clean up**
A specialist firm was contracted to carry out the removal of the petrol from the soil. Petrol was extracted gradually through the floorboards over 10 days and the soil was treated with micro-organisms that are able to break down hydrocarbons. The clean-up operation cost £111,000.

**Incident outcome**
The taxi driver has recently pleaded guilty to four charges relating to the storage of fuel and one of failing to discharge his health and safety responsibilities. He has received an eight-month jail term, which has been suspended for two years.

**Fuelling controversy: the health impact of the fuel crisis**
*Dr Karen Lock and Dr Steve Hajioff, Visiting Research Fellows, European Centre for the Health of Societies in Transition, London School of Hygiene and Tropical Medicine, Keppel Street, London. WC1E 7HT.*

The September protests against high fuel prices caused a rapid and unexpected petrol shortage sending the UK into ‘crisis’. With the prospect of repeat protests looming the media were concentrating on the negative effects of high fuel prices and fuel shortages. A rapid health impact assessment reveals that the health consequences of the petrol shortages are more complex.

During the September crisis, people noticed that decreased car usage caused improvements to the perceived environment, including decreases in noise, congestion and air pollution. Other psycho-social impacts were more complex.

For most people it was a manageable crisis; they did not lose their jobs, emergency services still functioned. People were seen to be united by the common disruption. This increased neighbourhood cohesion in a situation of shared adversity (the ‘blitz spirit’) helped some people to fill important psychological affiliation needs. For others, the crisis increased feelings of stress and lack of control. The spontaneous blockades and anti-government protests were portrayed in the press as an anarchic society on the brink of collapse. Fear of shortages lead to queuing and panic buying not seen since the Winter of Discontent. These anxieties may have contributed to an increase in mental ill-health, particularly known to be associated with auspicious events.

The fuel crisis may have increased community networks simply by reducing traffic flow. Heavy road traffic has been shown to divide communities, reduce opportunities for children’s independent social contacts, reduce social support and worsen quality of life, factors that have been linked to various health outcomes. In contrast the reduction of transport would also have created barriers to accessing goods and services, particularly for those living in rural communities. These adverse health effects fall disproportionately on the most isolated groups; people with disabilities and the elderly.

Economic effects were among the biggest negative impacts of the fuel protests. The cost to the individual may be greater than the few days of unpaid leave some people were forced to take. The fuel shortages cost the UK economy 10% of its output, approximately £250 million a day. In the short term the Confederation of British Industry reported that many firms had scaled back production and laid off staff during the crisis. The longer term effects right across the economy may contribute to business failures causing increased unemployment.

Changes in transport use could have created significant health benefits. In the short term the fuel crisis promoted walking and cycling, and increased public transport use. Bicycle sales were reported to have increased six-fold in some shops. The increase in the use of non-motorised transportation could improve cardiovascular and other health outcomes of the population if sustained. In South London one train company reported...
100,000 extra passengers during the crisis. With at least eight other mass transit services operating in London alone this would mean a huge number of vehicular journeys were averted, even if this were not generalisable beyond the capital. It showed that many more people would use public transport if available. Unfortunately the consequences of the Hatfield rail crash (17 October 2000) may have negated much of this change.

The reduction of road journeys may have led to a short term decrease in pollution and some consequent decrease in morbidity. During the fuel shortage there was an apparent decrease in air pollutants in some urban areas, although the health significance of this is likely to be minor. The effect on mortality of daily fluctuations in air quality is small. Most of the deaths due to acute increases in air pollution are deaths in the elderly and chronically sick which have been hastened by a few days. Less contentious is the relationship between chronic illnesses and patients who are being hospitalised. It is well established that high fuel tax deters car use. By averting car journeys we are improving health in many ways; cleaner air, fewer injuries, more exercise and improving community networks. Decreasing fuel tax would be like supporting a cut in cigarette duty.

Another area of health impact was the delivery of services to the population. The supply chain for shops and services was disrupted causing shortages, particularly of fresh produce, which were exacerbated by panic buying. More importantly the NHS was put on red alert for the first time in 11 years. The fuel shortage negatively affected staff availability and the supply of drugs, food and other essential resources; with some hospitals running out of basic materials like sutures. The cancellation of patient transport caused some acute trusts to cancel non-emergency surgery, which will have longer-term effects of increasing waiting times and increased morbidity. Emergency ambulance services were apparently maintained but there was a real risk that a continuing crisis could have led to serious problems. The potential health impact of ambulance delays is well known. After the failure of the London Ambulance Computer system in 1992, it was estimated that in 3 days 20 deaths could be attributed to problems with ambulance response in the 7.5 million population covered. At that time people were still able to use personal vehicles.

At the time the government response to the September fuel crisis allowed access to emergency fuel supplies for priority purposes. Despite this community NHS services reported a decrease in home visits and skeleton out of hours services. The vast numbers of ‘informal’ carers not employed by health or social services were not included on the priority fuel list. These impacts on community care may well have harmed vulnerable groups: including the chronically ill, elderly and people with special needs.

As the deadline imposed by fuel protesters nears politicians are advocating contingency measures including stockpiling. Ministers are not alone in preparing for repeat protests as car accessories chain Halfords had reported a 50% increase in the sale of petrol storage cans from the same time last year.

There are two key health lessons we should have learnt from the September crisis:

- Most of the negative health impacts of the crisis were a result of the disruption of services, not least health services, and the loss of society’s normal functioning. This disruption resulted from of a lack of intrinsic robustness in our systems through just in time management and the pursuit of short-term efficiency gains. This disproportionately impacts upon the most vulnerable in society. Short term contingency planning, such as stockpiling, is insufficient for effective health service function.
- A reduction in fuel taxes by the Chancellor would negatively impact on funding for public services. It is well established that high fuel tax deters car use. By averting car journeys we are improving health in many ways; cleaner air, fewer injuries, more exercise and improving community networks. Decreasing fuel tax would be like supporting a cut in cigarette duty.

**References**

CONFERENCE REPORTS

David Donegan, Health Emergency Planning Advisor, NHSE-London

FAMAT stands for ‘Forensic and Medical Aspects of Terrorism’ comprising a national group of experts from the police, military, NHS and other specialist centres. It was formed to explore the unique clinical management, continuity of evidence and investigative aspects of crime and particularly terrorism.

The seminar was opened by Mr. David Veness (Asst. Commissioner of the Metropolitan Police) who outlined an initial overview of the remit of the group and its aims, particularly disseminating best practice and increasing awareness of the topic amongst medical services. This was followed by an introduction to the current terrorist threat by a member of the special branch. Source of many current threats within the UK include animal rights groups, middle eastern factions, fanatics and republican Irish dissidents.

There followed an exploration of different terrorist weapons which had been used recently and their technical construction. The relationship was shown between a seemingly meaningless piece of debris and a piece of forensic evidence, which could identify the device and potentially the attacker.

The police response was outlined to any suspected terrorist incident and the protection and preservation of all forms of possible evidence was discussed, including on occasion police actually being present to receive foreign objects on removal during an operation. A case study around the 15th August 1998 Omagh, Northern Ireland, bombing was reviewed where clinical and management issues were highlighted. This was followed by a final presentation on the psychological affects and outcomes of such incidents.


Workshop: Public Exposure to Asbestos: the role of CIRS and Occupational Hygienists.
Fiona Welch, Environmental Research Engineer—Air, Chemical Incident Response Service

CIRS presentation summary
CIRS was involved with 25 chemical incidents resulting in asbestos fibre contamination of the non-occupational environment in 2000. These included:
- fires in warehouses built from or containing asbestos materials
- uncontrolled demolition of buildings
- inappropriate disposal of asbestos material

If these incidents are inadequately or slowly investigated and cleaned up, chronic exposure and/or anxiety to the local population may result. Problems for various agencies in finding experts to provide timely sampling within an appropriate sampling strategy have been reported. The more specialised training and skills available to occupational hygienists in the routine control of working environments with potentially free asbestos fibres suggest that there may be a role for close...
collaboration in a multi-disciplinary environment to minimise harm and concern to the population.

**Workshop outcome**

Case studies of the types of asbestos incidents that are dealt with by the local Health Authority and CIRS were presented followed by a discussion on if and how occupational hygienists may use their skills to complement those of the public health physician in planning for or responding to such events.

A consensus was agreed that many occupational hygienists have developed expert skills and knowledge invaluable for the planning for or response to chemical incidents involving asbestos. These range from health risk assessment and communication to advice on clean-up and monitoring. Those present agreed that they would expect an occupational hygienist to be involved at some stage during the management of an asbestos incident, however many recognised that this may only be at the request of the organisation responsible – such as the owner of the building.

One delegate recalled overseeing the health assessment and clean-up following a factory fire involving asbestos at the request of the company with very little interaction with the local authorities. There is therefore scope for improved coordination and communication between the different health specialities.

There may be resources readily available to your local Environmental Health professionals for the management of asbestos incidents. At least two delegates were based in Local Authorities as part of occupational health services. In addition, advice is available from the Health and Safety Executive (HSE). Environmental Health practitioners can contact their Local Authority Liaison Officer within HSE for advice.

**Other sources of information**

- The British Institute of Occupational Hygienists (BIOH) holds a directory of their members, many of which hold qualifications in asbestos. Copies are available on request (ring 01332 298087). Alternatively a Directory of Consultancies employing appropriately qualified hygienists is available via www.bioh.org/cgi-bin/www.bioh.org/consult.cgi
- HSE information on asbestos: www.hse.gov.uk/pubns/asbindex.htm or telephone local area office (page 18-19).
- For a list of UKAS accredited laboratories: www.ukas.co.uk/new_docs/accredit.htm, or telephone 020 917 8400 (9-5, Monday to Friday), or email: info@ukas.com. These laboratories have not been put into categories, so includes all type of analysis.

**Environmental Protection and the Fire Brigade: March 2001**

Emma Woodey, Environmental Research Engineer – Land, Chemical Incident Response Service

The immediate or emergency response to an acute chemical incident usually involves the emergency services and in most cases the Fire Brigade will take a lead role. The five-week long Hazardous Materials and Environmental Protection (HMEP) course at Fire Service College, Moreton-in-Marsh, Gloucestershire, addresses some of the important issues that need to be considered when dealing with such events including protective clothing and decontamination, legislation (CIMAH/COMAH), risk assessment and environmental issues.

I joined the course for three days in March to observe part of the Environmental Protection Module. Days one and two were classroom based and involved a series of lectures and case studies presented by college staff and representatives from the Environment Agency. Day three was based on the training ground. The training ground is a disused airfield where a variety of accidents can be staged; on a short stretch of motorway, in disused train carriages and on aeroplanes, old cars, buildings and even a ‘ship’ at the edge of a large pool of water. Four ‘incidents’ were reconstructed:

- a leak of oil from a drum into a river
- a milk tanker crash rupturing an oil pipeline adjacent to a stream; trout farm downstream
- a road tanker crash – tanker carrying beer
- contaminated fire water runoff to surface water drain; drinking water abstraction downstream

Fire-fighters were required to respond to the incidents using the equipment that is available to them in ‘Grab Packs’ and on specialist Environmental Units.

Grab packs, which are provided by the Environment Agency, are carried on most front line appliances in England and Wales. They contain a selection of materials and equipment that can be used for the temporary containment of leaks and spills. Items in the grab pack include putty (used to block holes), a clay mat drain cover, poly-boom (filled with water to make a physical barrier to stop the flow of chemicals into drains/water courses) and absorbent pads which can be used to soak up a range of chemicals.

Overall, attending the course provided the opportunity to gain a better understanding of the fire brigade role in responding to an acute event and some hands on experience of containing a chemical leak or spill.
CIRS Training for 2001

CIRS Food Training Day Tuesday 12th June 2001
(for CsCDC, CsPHM and Specialist Registrars in Public Health Medicine and Local Authority Environmental Health Officers).
This one day course is designed to consider CIRS/CDSC Surveillance, the role of the Food Standards Agency in responding to chemical incidents, Local Authorities role in investigating chemically related food incidents, and such toxins as scrombotoxin and other ‘nasties’. At the conclusion of the day it is intended that a checklist for food related incidents will be agreed. A maximum of 30 places are available for this course with 15 still available—please apply now to reserve your place.

CIRS Transport Training Day Thursday 26th July 20001
((for CsCDC & CsPHM who have responsibility for chemical incidents, who have attended the basic ‘how to respond’ course).
CIRS has been concerned increasingly about the difficulties of planning for transport related incidents. This one day course will consider air, road, rail and sea events by reviewing recent incidents. Various agencies such as the Pollution Control Branch of the Maritime and Coastguard Agency have been asked to present their roles and responsibilities. The aim is to try and develop a clearer approach on how to respond to chemical incidents arising from transport accidents. A maximum of 30 places are available with 15 still available—please apply now to reserve your place.

CIRS How to Respond to Chemical Incidents Tuesday 25th September 2001
(for Public Health Consultants and Specialist Registrars on call)
This one day course is an introduction to chemical incident response. Topics covered include a review of recent chemical incidents, how to respond to chemical incidents and lessons learnt, decontamination, exercises and information available from CIRS and the Medical Toxicology Unit. A maximum of 40 places are available, with 12 still available—please apply now to reserve your place.

CIRS Land Contamination Training Day Thursday 11th October 2001
(for CsCDC, CsPHM and Specialist Registrars and Local Authority Environmental Health Officers).
This specialist training day, developed over the last two years, will cover a selection of issues focused on the management of land contamination incidents. The day will be of most benefit to those who have already attended a general training day on how to respond to chemical incidents, or have been involved in the management of land related chemical incidents. A maximum of 30 places are available.

CIRS Air Contamination Training Day Thursday 22nd November 2001
(for CsCDC, CsPHM and Specialist Registrars and Local Authority Environmental Health Officers).
This specialist training day, developed over the last three years, will cover a selection of issues focused on the management of acute and chronic air contamination incidents. The day will be of most benefit to those who have already attended a general training day on how to respond to chemical incidents, or have been involved in the management of air related chemical incidents. A maximum of 30 places are available.

CIRS Water Contamination Training Day Friday 7th December 2001
(for CsCDC, CsPHM and Specialist Registrars and Local Authority Environmental Health Officers).
This specialist training day, developed over the last three years, will cover a selection of issues focused on the management of acute and chronic water contamination incidents. The day will be of most benefit to those who have already attended a general training day on how to respond to chemical incidents, or have been involved in the management of water related chemical incidents. A maximum of 30 places are available.

All the training days listed for 2001 will be held in the Sherman Education Centre, 4th Floor Thomas Guy House, Guy’s Hospital, by London Bridge Station London SE1 9RT
Those attending CIRS course will receive a Certificate of Attendance and CPD/CME accreditation or points
Places will be confirmed as reserved upon a receipt of a £25 refundable deposit. For those working in organisations without Service Level Agreements with CIRS a charge of £100 for attendance at each course will be made. For booking information on these courses and further details please contact Rico Euripidou or Henrietta Harrison on 0207 771 5381
Please call the Chemical Incident Response Service on 0207 771 5383 if you would like information on other courses.

CIRS Staff Developments
CIRS is continuing to build the team to support Health Authorities, particularly with our new IPPC support role. Henrietta Harrison has returned to the team following maternity leave. Dr Graham Robertson has started as our locum IPPC Co-ordinator with Elinor Battrick assisting him. Dr Martin Wilks sadly leaves CIRS at the end of June to continue his career in industry in Europe. CIRS has just received Medical Manpower approval from Guy’s and St Thomas’ Hospital with permission to advertise for a public health medicine consultant and a consultant environmental epidemiologist. Please contact me if you are interested in knowing more about either of these posts!

Chemical Incident Report
Edited by Dr Virginia Murray, prepared and distributed in collaboration with Rico Euripidou, Ivan House, Joan Bennett, Elinor Battrick and the staff of the Chemical Incident Response Service.
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