



Aims

Provide an overview of cancer clusters

Consider aspects of investigating cancer clusters

- issues
- approaches
- examples

Provide suggestions on where to go and what to do

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Cancer clusters

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What is a cancer cluster?

- Various definitions

“An unusually high number or rate of cancer”

- Usually describes one type of cancer, but may be all cancers

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A few concepts about cancer

- Common disease
- Usually more common with age
- Long latency
- Usually has one or more risk factors
- Occurs randomly
 - differences in rates often due to chance

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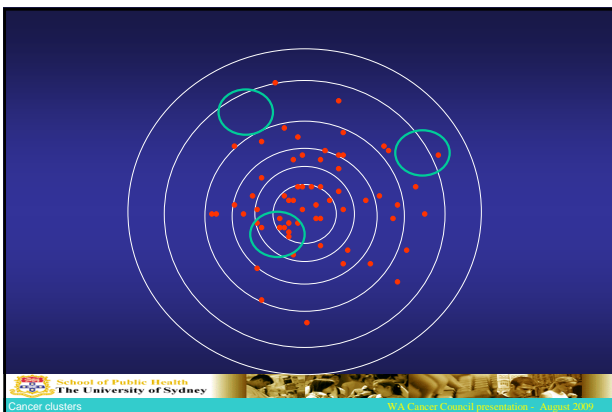
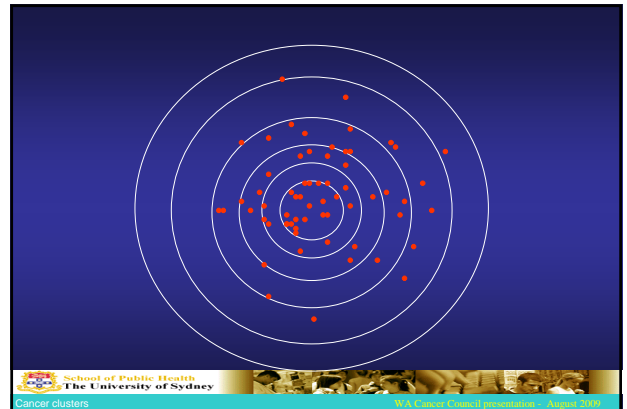
Why is it so hard??

- Most cancers can be caused by more than one type of exposure
- The same exposure can occur in different settings
- Long latency obscures the connection to exposure
- Usually no way to determine the cause in an individual case

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- ### When do concerns arise?
- Concerning exposures
 - Unusual cancer type
 - Young people
 - Not giving initial concerns appropriate consideration
 - Industrial relations or community issues
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- Cancer clusters
- 10.1 Cancer Cluster presentation - August 2016

- ### When should concerns about cancer clusters be raised?
- Number of cases?
 - Type of cancer?
 - Ages of affected persons?
 - Type of exposures?
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- ### When should concerns about cancer clusters be raised?
- Number of cases?.....Usually need more than just a few
 - Type of cancer?.....Rare or unusual cancers; same type
 - Ages of affected persons?.....Young people
 - Type of exposures?.....Known carcinogens; known connection to identified cancers
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Challenges

- Lack of information about exposure
- Uncertainty about case definition
- Incomplete case identification
- Uncertainty about population at risk

Challenges

- Interpretation of statistical tests
- Public perception that there must be a problem
- Context
- Other agendas
- Ethics restrictions / requirements

Response

- Prompt response
- Explain the challenges
- Emphasis on exposures and case characteristics rather than just on rates
- Involve all interested parties (reference group)
- Regular feedback

Two stage approach

- Stage 1: review of past and current exposures
- Stage 2: epidemiological analysis of cancer cases
- Stage 1 and Stage 2 usually overlap
- Good communication throughout

Important principle

- If no concerning exposures are found but there is a high rate.....
- It is almost certain that the high rate was due to chance
- If still concerned, need to study another workplace/community with a similar exposure

Famous "clusters"

- Chimney sweeps and scrotal cancer
- Vinyl chloride and angiosarcoma of the liver
- Asbestos and mesothelioma
- HIV infection and Kaposi's sarcoma
- All characterised by high exposure to "new" exposure

What causes cancer?

- International Agency for Research on Cancer (IARC)
- Group 1: **Definitely** causes cancer in humans
- Group 2A: **Probably** causes cancer in humans
- Group 2B: **Possibly** causes cancer in humans
- Group 3: **Not enough evidence** to decide
- Group 4: **Does not** cause cancer in humans

ABC Toowong building

ABC - background

- Concerned staff
- Management perceived as slow to react
- Initial investigation focused on personal risk factors
- Staff more concerned and unhappy!

Known external risk factors for breast cancer

- Ionizing radiation
- Alcohol intake
- Post-menopausal oestrogen intake
- Shift work?

ABC – what did the study team do?

- Set up a reference group
- Reviewed relevant scientific literature
- Interviewed affected women
 - work and workplace
 - known risk factors for breast cancer
- Rate of breast cancer in the Toowong female workforce
- Investigated the site for possible contamination
 - known or suspected environmental risk factors for breast cancer
 - other carcinogens

ABC – what was found?

- 10 women diagnosed with breast cancer whilst working at Toowong
- Many cases in younger women
- Rate six times higher than expected
- Initial probability – “one in a million chance”
- Adjusted probability – “one in 25 chance”
- Suggestion of increasing risk with increasing length of employment

BUT.....

ABC – what was found?

NO exposures of concern

ABC – what was concluded?

- Real increase in breast cancer rate
- “Highly unlikely” to be due to known exposures
- Unlikely to be due to increased personal risk factors
- Excluded all plausible environmental explanations
 - No need for further investigations on site
- Conduct similar studies in other ABC offices

ABC – what was the outcome?

- The ABC building was abandoned.
- What would you have done?????

Breast cancer cases at ABC Melbourne office

By Lexi Metherell for AM

AM abc.net.au/am

Posted Thu Jul 9, 2009 7:19am AEST
Updated Thu Jul 9, 2009 10:15am AEST

Confirmation of three recent cases of breast cancer at the ABC's Southbank office in Melbourne has revived fears of another cancer cluster at the broadcaster.

It has been less than three years since the ABC abandoned its Queensland headquarters in the Brisbane suburb of Toowong, after an unusually large number of staff there developed breast cancer.

Experts say it is impossible to tell whether another cluster is emerging, but it is unlikely to be anything more than a tragic coincidence.



Experts say it is impossible to tell whether another cluster is emerging (ABC News: Giulio Saggin, file photo)

Map: Southbank 3006

<http://www.abc.net.au/news/stories/2009/07/09/2620793.htm>

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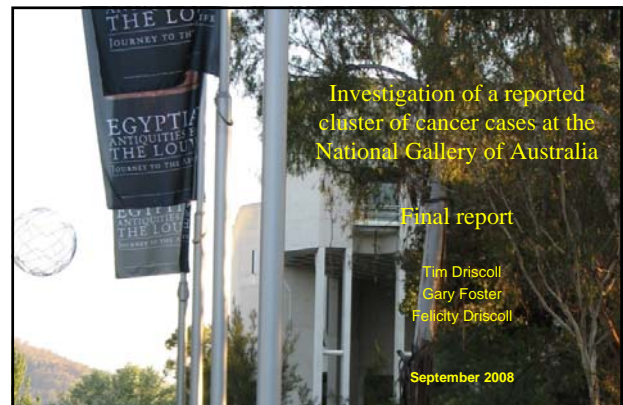
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Investigation of a reported cluster of cancer cases at the National Gallery of Australia

Final report

Tim Driscoll
Gary Foster
Felicity Driscoll

September 2008

National Gallery - background

- Concerned staff
- Management perceived as slow to react
- Initial investigation very limited
- Staff more concerned and unhappy!

National Gallery – what did the study team do?

- Set up a reference group
- Reviewed relevant scientific literature
- Workplace investigation for carcinogens
- Interviewed workers (but not all cases)
- Number, rate, type and characteristics of cancer in current and past workers

National Gallery – what was found?

- 57 current and former workers diagnosed with cancer
- Types with the highest numbers were the most common community cancer types
- All cancers.....No increase
- Lung cancer.....40% increase (very likely due to chance)
- Bowel cancer.....6% increase (very likely due to chance)
- Bowel cancer (security guards).....Increased risk (very likely due to individual risk factors)

National Gallery - exposures

IARC Group 1	IARC Group 2A	IARC Group 2B
Asbestos	Diesel fumes	Carbon black
Benzene	Epichlorohydrin	Carbon tetrachloride
Cadmium	Polycyclic aromatic hydrocarbons	Cobalt
Environmental tobacco smoke	Tetrachloroethylene	Dichloromethane
Ethylene oxide		Dichlorvos
Formaldehyde		Extremely low-frequency electromagnetic fields
Radium		Magenta
Wood dust		Potassium bromate
X-rays		Synthetic mineral fibres
		Welding fumes

National Gallery – what was found?

- Lots of carcinogens
- No exposures at a level that would meaningfully increase risk

National Gallery – what was concluded?

- Very unlikely that any of the cancers identified in Gallery staff members were related to exposures experienced while working in the Gallery building
- No further investigation of the issue considered necessary
- Re-design the loading dock

National Gallery – what was the outcome?

- The loading dock was demolished as part of renovations
- The new loading dock is very well designed
- No further issues re cancer

ABC vs National Gallery

- | ABC | National Gallery |
|-------------------------|--------------------------|
| • Staff dissatisfaction | • Staff dissatisfaction |
| • Single cancer type | • Different cancer types |
| • Common type | • Common types |
| • Young age | • Typical age |
| • High rate | • No raised rate |
| • No worrying exposures | • No worrying exposures |
| • Moved | • Stayed |

Ethylene oxide and community exposure

Concerns over possible Sydney cancer cluster

Posted Tue Aug 14, 2007 10:24am AEST
Updated Tue Aug 14, 2007 2:32pm AEST

A group of residents from Sydney's northern beaches wants the New South Wales Health Department to investigate rates of illness linked to gases being discharged from a medical supplies company.

The Pittwater Council shut a medical sterilisation equipment company last month after revelations that untreated ethylene oxide had escaped from the plant at Mona Vale.

A community representative, Kim Brebach, says a meeting of 120 residents heard concerns that local children have higher-than-normal rates of cancer.

"We're calling for a health study into the area because the

a kilometre of Unomedical, does not believe the fumes caused his son's illness, but told a residents' meeting last week he knew of six local children with cancer.

"I just wanted to alert everyone that cancers have been found out here in this area. Maybe it's a contributing factor, we will never know," he said. "We have been told cancers in children are rare but we get a hell of a lot in this area. It doesn't seem rare to us."

Dr Luca Dalla Pozza of the oncology unit at the Children's Hospital, Westmead, said of the 14 children with cancer, seven had leukemia. "As much as we want to blame pesticides and toxins, it falls into the realm of chance. But ... Mr Varley ... has every right to be concerned. Even if it was safe, it seems a silly thing to do to let the exhaust occur."

A Mona Vale activist, Kim Brebach, said the residents' meeting had called on NSW Health to investigate rates of illnesses associated with ethylene oxide such as leukaemia, lymphoma and genetic disorders. "The community is afraid that in the future they will get some kind of cancer ... The department is saying 'don't panic', but we have to seriously investigate it," he said. "The general feeling is they aren't being as proactive about it as they could be."

Mr Brebach called on Unomedical to say how much ethylene oxide had been emitted, but a company spokesman, John MacGregor, said such data did not exist. "There was never any requirement for the company to monitor that. I can understand why people ... are concerned but the company is spending about half a million [dollars] to import and install a catalytic converter, which should overcome any air quality questions." He said NSW Health had written to residents advising them that no cancers could be sourced to the plant.

NSW Health was negotiating with the company over the data it could release about the emissions, said Michael Staff, a public health physician from Northern Sydney-Central Coast area health service.

The important thing was the emissions had stopped, he said. "We need to assess whether there has been any risk to people's health [and] that may well entail some sort of health study, but that is up to the government to decide."

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Cancer clusters <http://www.abc.net.au/news/national/purex-search-for-cancers/2007/08/15/118857428912.html>

Concerns over possible Sydney cancer cluster

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A group of residents from Sydney's northern beaches wants the New South Wales Health Department to investigate rates of illness linked to gases being discharged from a medical supplies company. **Map: Mona Vale 2103**

The Pittwater Council shut a medical sterilisation equipment company last month after revelations that untreated ethylene oxide had escaped from the plant at Mona Vale.

A community representative, Kim Brebach, says a meeting of 120 residents heard concerns that local children have higher-than-normal rates of cancer.

"We're calling for a health study into the area because the emissions have been going on for ten years," she said.

"We expect the health effects from this particular chemical - which are reasonably well known - are likely to be able to be found.

"So, we are calling on the Health Department to conduct a study in conjunction with the local council."

Doctor Michael Staff, from the Northern Sydney Central <http://www.abc.net.au/news/stories/2007/08/14/200419.htm?site=news>

Doctor Michael Staff, from the Northern Sydney Central Coast Area Health Service, says it is trying to obtain more information about past exposures and the levels of the chemicals that were released.

"We can model the emissions to work out what level of the gas may have been associated or may have been present in the local community on an annual average, and then get the best possible expert advice that we can get," he said.

A member of a NSW Health advisory panel says there is cause for concern about the chemical that was released from the factory.

The Director of Research at the Sydney Cancer Centre, Professor Bruce Armstrong, says ethylene oxide has been proven to be harmful.

"The evidence in experimental animals is really strong to the extent that people say there is sufficient evidence that ethylene oxide is a carcinogen in experimental animals," he said.

"It also shows evidence of being able to damage genetic material, make chromosomes break - and as well as seeing that in experimental animals - that is seen in men who have been heavily exposed."

The NSW Opposition says the government must implement air quality guidelines for a gas emitted by the company.

The Opposition leader, Barry O'Farrell, says regulations about the release of the gas need to be introduced.

"I think Phil Koperberg, as the Minister for the Environment, has to explain how it is that there is no standard that can be implemented or monitored in relation to the release of this chemical," he said.

"And secondly, why it is that the EPA [Environmental Protection Agency] is able to avoid any responsibility for ongoing monitoring of air quality around facilities like this."

Cancer clusters <http://www.abc.net.au/news/stories/2007/08/14/200419.htm?site=news>

National Breaking News

No proven link to cancer cluster: company

| AAP | August 14, 2007 02:36pm | A+ A- [print] [email]

A MEDICAL supplies company ordered to cease emissions of a dangerous gas insists there's nothing to link it to any possible cancer cluster around its northern Sydney factory.

NSW health authorities will investigate the release of ethylene oxide gas from medical supplies company Unomedical in Mona Vale.

The Sydney Morning Herald today said 14 children in and around Mona Vale had developed cancer in the 10 years since Unomedical began discharging the gas, which the World Health Organisation lists as a carcinogen.

Pittwater Council ordered the company to stop discharging the gas from its premises in late July.

Unomedical managing director Anders Kolding said today four of the cancer cases listed in the newspaper article were in Frenchs Forest - about 10km from the factory.

"Claims in the media that there was a cancer cluster in Mona Vale that could be linked to the company were not supported by facts," Mr Kolding said.

<http://www.abc.net.au/news/0.21999.22248632.20277.00.html>

Expert plays down fears of Sydney cancer cluster

<http://abc.gov.au/news/stories/2007/08/14/2005156.htm?site=news>

Posted Tue Aug 14, 2007 7:48pm AEST

A medical expert advising the New South Wales Government says it is unlikely that a reported cancer cluster on Sydney's northern beaches was caused by a carcinogenic chemical produced in the area. **Map: Mona Vale 2103**

A group of Mona Vale residents have called for an investigation into the rate of cancer in local children after a medical supplies company in the area was shut down because it had been emitting an untreated carcinogenic chemical called ethylene oxide.

However, Cancer Institute New South Wales chief executive officer Jim Bishop has played down fears of a cluster.

"Most of the worries about clusters don't turn out to be clusters," he said.

The State Government has set up an advisory committee to look into the emissions and the reported cancer cases.

The committee's spokesman, Bernard Stewart, says a link between ethylene oxide and cancer has not been definitively proven in humans.

"I do not believe it is likely that these cancers have been caused by that emission," he said.

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"I do not believe it is likely that these cancers have been caused by that emission," he said.

Ethylene oxide and community exposure

- "This study concludes that there is no evidence of increased cancer rates in the Mona Vale postcode for the period 1996 to 2005."
- "This does not support the view that the ethylene oxide emitted from the Unomedical factory has caused an increase in cancer rate."

Response

- Prompt response
- Explain the challenges
- Emphasis on exposures and case characteristics rather than just on rates.
- Involve all interested parties
- Regular feedback

Where to go

- Employer
- Union
- Occupational physician
- University public health department
- Department of Health
- Worksafe WA

Change what you can change

- Stop smoking
- Exercise regularly
- Eat plenty of vegetables and fruit
- Maintain appropriate weight
- Restrict sun exposure

Conclusions

- Cancer is a common disease.
- Cancer "clusters":
 - are expected due to random variation
 - are usually not caused by occupational or environmental exposures
 - are very rarely due to unknown exposures
 - must not be dismissed without investigation of some sort
 - good communication is essential.
- Change what you can change.

Cancer clusters – fact or fiction?



Next week's lecture

**The rights and wrongs of cancer care for
older Australians**

Dr Christopher Steer

Border Medical Oncology, VIC

