

The Epidemiology of Occupational Toxic Exposures presenting to Emergency Departments in Singapore



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What is the extent of occupational injury that is caused by toxic exposures at the work place?

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Background:

- Singapore is an island state with 4.4 million people on 700 sq km of land.
- ¼ of the population is non-residential
- The labour force: about 2.3 million (50%)
- 20,000 factories registered (2007),
- >80 000 workers required medical surveillance (many chemical related): 1600 factories in 2006.
- Occupational Safety & Health Division (MOM) - incident reporting system - monitors occupational diseases and injury.

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I-report (WSH regulation)

- Mandatory reporting of occupational exposure criteria includes >3 days of medical leave, hospitalization >24hrs, fatality
- Reporting primarily by workers, employers, occupier etc.
- Doctors: 31 mandatory occupational disease - usually chronic diseases

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MOM statistics - incident reporting 2006

- | | |
|--|------------|
| 1. Fire/explosion: | 39 |
| 2. Hot substance: | 190 |
| 3. Harmful substance exposure/contact: | 88 |
| Total number of cases reported: | <u>317</u> |

(Total number of reported cases from 2001-2003 = 361 cases – about 120 case a year)

Reference:

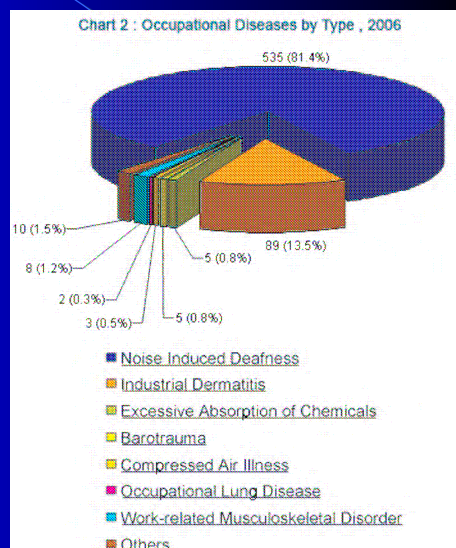
http://www.mom.gov.sg/publish/momportal/en/communities/workplace_safety_and_health/reports_and_statistics/industrial_accidents.html

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Occupational diseases: 2006

Possibly from toxic exposure:

- | | |
|---------------------------------------|------------------------|
| 1. Dermatitis: | 89 cases |
| 2. Excessive absorption of chemicals: | 5 cases |
| 3. Occupational lung diseases: | 2 cases |
| 4. Others (?): | 10 cases |
| Total number = | <u>106 cases</u> |
| – | <i>16% (657 total)</i> |



The Questions

1. What is the magnitude of industrial related toxic exposures that present to Emergency Departments?
2. What are the demographics of toxic exposure?
3. What are the clinical characteristics?
4. What can be done to improve workplace and worker safety?

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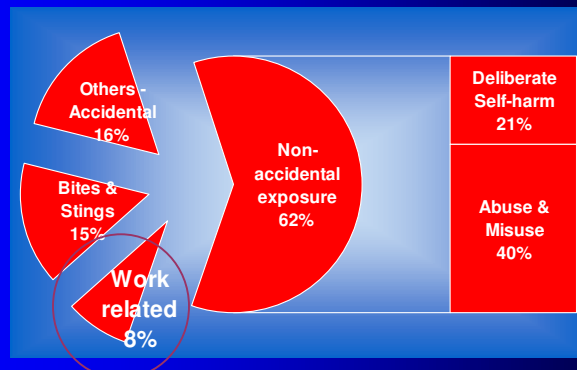
Methods:

- Retrospective study
- Toxic exposure cases identified by ICD code
- Presented to the EDs of Singapore General Hospital and Changi General Hospital from *2001 to 2003*.
- Cases classified as industrial accidents were included.
- Demographic and clinical characteristic captured on standard survey forms
- Analyzed using the SPSS software.

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Magnitude of Results:

- Work related toxic exposure comprised **8%** or **747** cases out of 9212 cases collected.
- They make up **<0.1%** of ED attendance



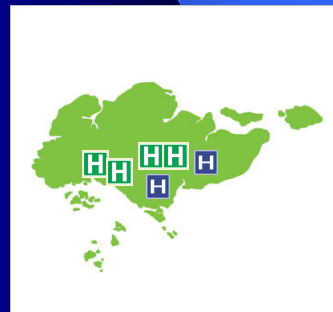
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ED population coverage

- 6 Public General Hospitals with A&E departments
- sees all Emergency Ambulance cases (995) + walk in cases
- Relative workload of 2 participating EDs (amongst 6 EDs) in 2001 = 41%
- Public hospitals admits 76%

- Public hospitals (included in study)
 - SGH: 592 cases (79.3%)
 - CGH: 155 cases (20.7%)

- Public Hospitals (not included in study)



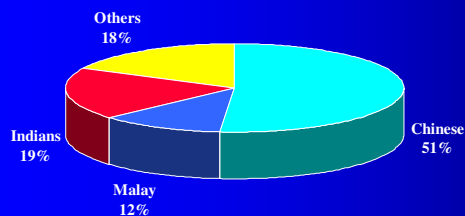
Extrapolated Catchment Population:

- 4.2 million population in 2004
- $\frac{3}{4}$ seen in public hospitals = 3.15 mil
- Extrapolated catchment population (41%) = 1.3 mil
- *Toxic exposure (occupation related) case rate approximated to be 0.2 case per 1000 population per year*
- Estimating 2 million working population = 400 cases of toxic exposure presenting to ED

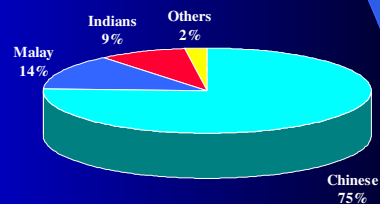
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Demographic Characteristics:

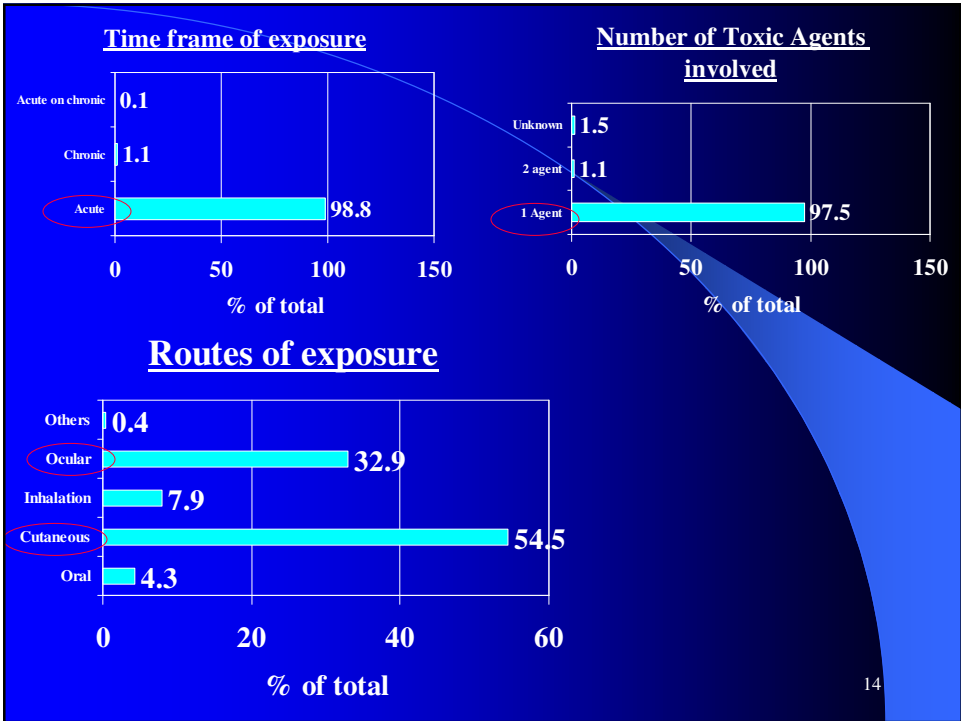
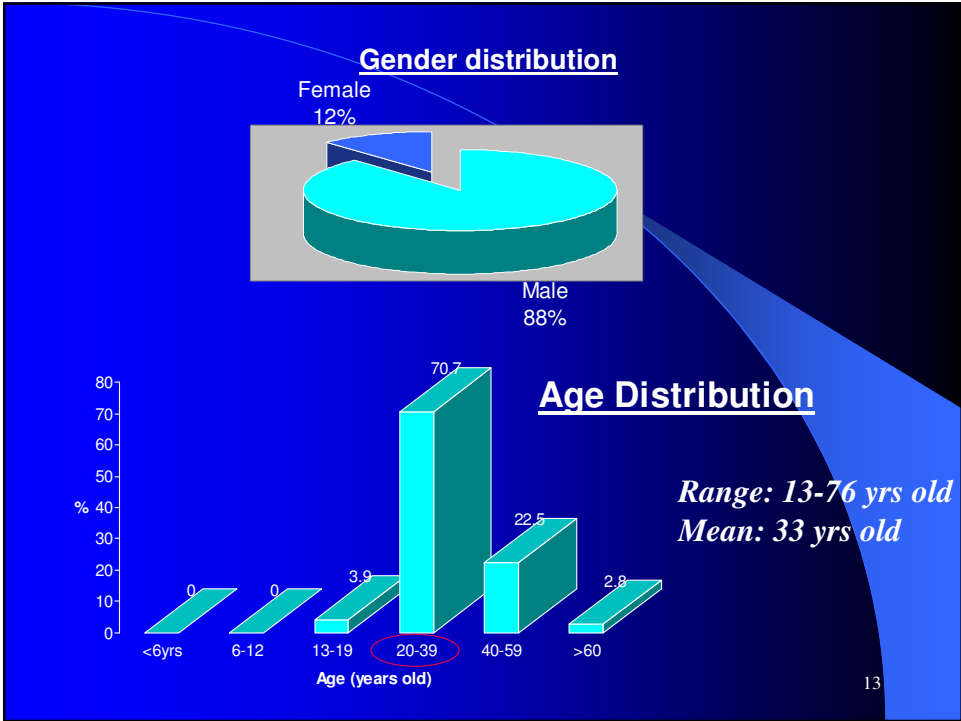
Distribution by Race

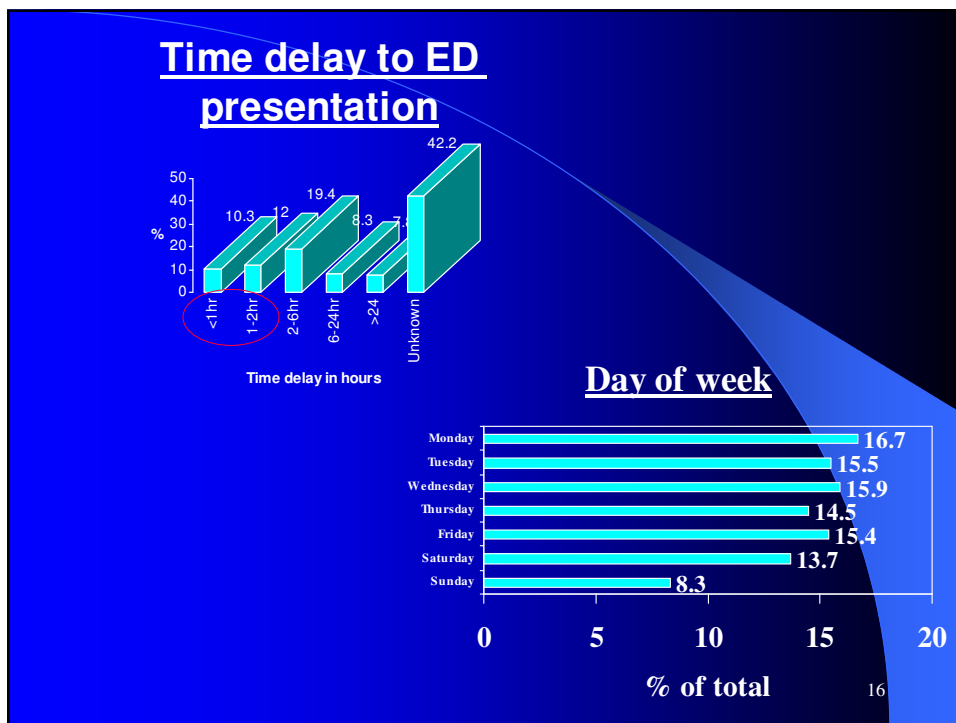
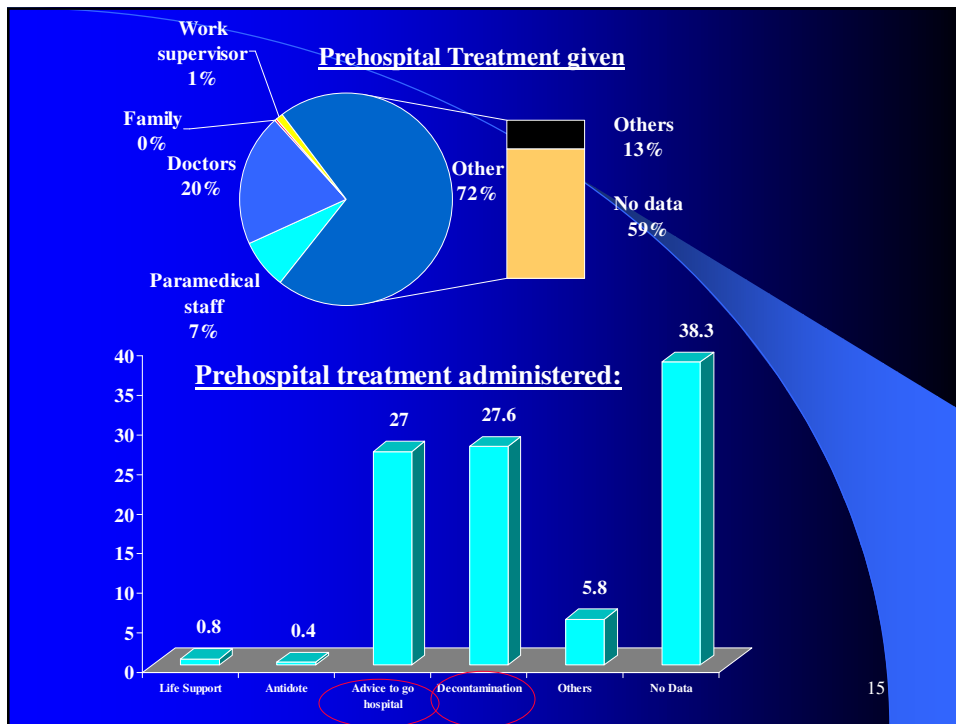


National Racial Demographic



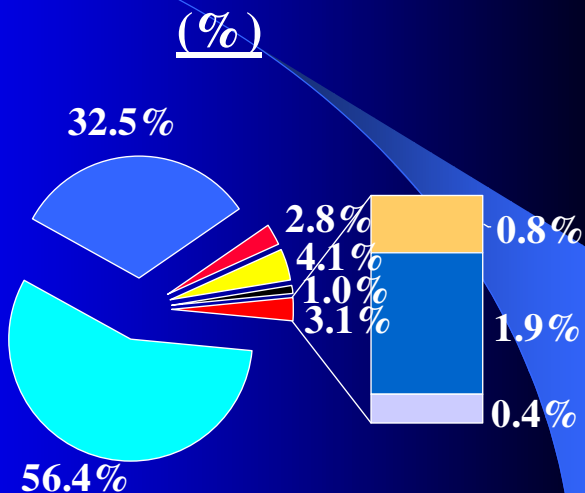
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Categories of Toxic Exposure

- Industrial Chem 56.4%
- Hot substances 32.5%
- Cleaning agents 2.8%
- Smoke inhalation 4.1%
- Others 1%
- Pesticides 0.8%
- Unknown 1.9%
- Alcohol 0.4%



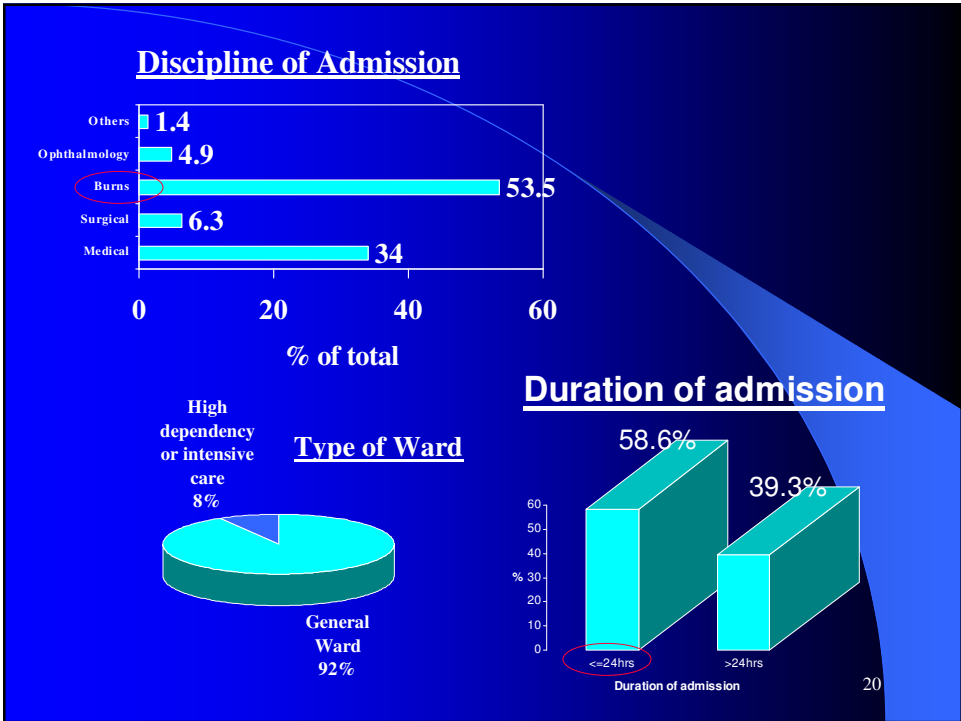
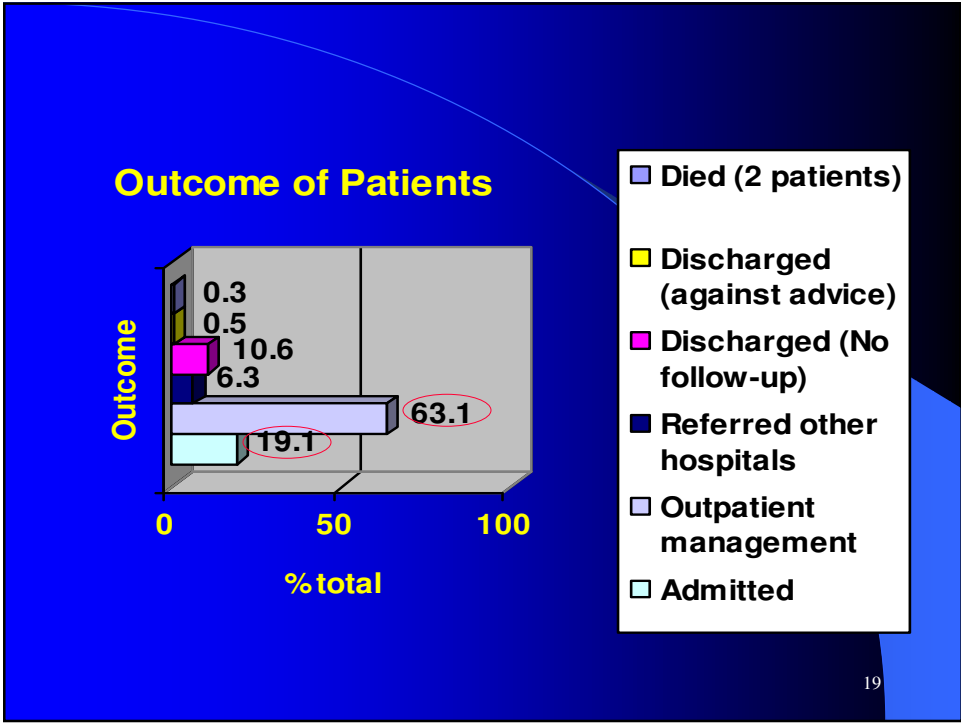
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Interventions and Drugs

ED Interventions:

| | Interventions: | Number | % of total |
|---|--|--------|------------|
| 1 | Airway management: intubation, oral airway | 19 | 2.5 |
| 2 | Breathing: O2 delivery | 26 | 3.5 |
| 3 | Circulatory support | 20 | 2.7 |
| 4 | Activated charcoal | 3 | 0.4 |
| 5 | Gastric lavage | 1 | 0.1 |
| 6 | Shower decontamination | 22 | 2.9 |
| 7 | Eye decontamination | 176 | 23.6 |
| 8 | Other decontamination procedure | 18 | 2.4 |
| 9 | Antidotes: Calcium preparations and Hyamine 0.2% | 4 | 0.5 |

Excluding beside standard therapy with analgesia, tetanus toxoid, wounds dressing



Limitations:

- Confined to more serious acute cases
- Mild cases, seen by General Practitioners or were self-treated: not captured
- Fatality cases who died at site excluded
- Retrospective study, possibility of underreporting etc

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Conclusions:

1. Work-related toxic exposure *<0.1% of ED attendance*
2. Extrapolated toxic exposure rate of *0.2 per 1000 population per year*
3. Mainly acute, single agent, cutaneous/ocular route exposure with 1/5th presenting *<2hrs post exposure.*
4. *>60% of patients had out-patient management*
5. *1/5th of patients were admitted of which 8% required intensive monitoring. 60% of patients admitted <24hrs.*

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Recommendations:

1. Closer coordination between the EDs with MOM on tracking toxic exposures
2. Short stay observation ward and toxicologist input could decrease need for admission.
3. Clinical toxicologist should be involved early in the management of critical cases esp when there is need for antidotes
4. Education and dissemination of information to workers regarding chemical safety and first aid measures can be explored.

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The End

Questions?

Thank-you!

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