Samsung Leukemia Case, Occupational Disease and Risk System

Domyung Paek
Korea
Key Points

• Samsung Leukemia Cases through “Conventional” Occupational Disease Diagnosis Framework
  – Controversies
  – Why they didn’t recognize Samsung Leukemia cases as Occupational Disease

• Risk Factor Epidemiology vs Risk System Epidemiology
  – What is the problem of risk factor approach
  – How we can identify risk factors through risk system
Samsung Leukemia Cases and Framework of Occupational Disease Causation
Miss Hwang and Her Father

2007,
During Leukemia Treatment
Chronology

- 2003, Samsung Semiconductor, Ki-heung Factory
- 2005, Diagnosis of Leukemia
- 2007, Death
- 2008, Semiconductor Epidemiology Report
- 2009, Risk Assessment Report
- 2011, Administrative Litigation, Lower Court
- 2013, Administrative Litigation, Higher Court
Controversies

<table>
<thead>
<tr>
<th>Company Side</th>
<th>Victims Side</th>
</tr>
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<tbody>
<tr>
<td>• No evidence of increase in cancer (leukemia) in semiconductor industries and factories of concern</td>
<td>• Increase of cancers, especially leukemia clusters, among workers</td>
</tr>
<tr>
<td>• No evidence of uses of or exposures to carcinogens (leukemogens)</td>
<td>• Heavy use of hazardous chemicals and carcinogens</td>
</tr>
</tbody>
</table>

• Workers employed during last 10 years, 1998~2007
  – Match their personal ID with Death and Cancer registries

• Death Certificate (Statistics Bureau)
  – Standardized Mortality Ratio (SMR)

• Cancer Registry (National Cancer Center)
  – Standardized Incidence Ratio (SIR)
Semiconductor Industry Study Results (2011)
D: cancer death, SMR     I: cancer incidence, SIR

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<tr>
<td>Total</td>
<td>Cancer</td>
<td>Lymphohematopoietic</td>
<td>Leukemia</td>
<td>Non-Hodgkin's Lymphoma</td>
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Occupational Disease Review Committee, 2009

• Identification of Disease

• Identification of Exposures
  – IARC carcinogen classification: I, IIA, IIB
  – Identify past exposures based on objective methods such as records

• Evaluate Exposure-Disease Relationships
  – Epidemiology Studies
  – Toxicology Studies

• Rule Out Cofounding Risks
  – Disease Patterns and Risk Factors among General Population
Amicus Curiae Brief, 2010

• Study Population
  – Industry started from 1970s’ and “still employed during last 10 years” should be strong survivors

• Control Group
  – General Population versus Healthy workers

• Exposures Assessment based on Job Title
  – Exposure Misclassification and Attenuation

• Disease Ascertainment based on Registry Matching
  – Depends on the Accuracy and Completeness of Certificates and Registration
  – Breast Cancer of Male(?)
Semiconductor Industry Study Results (2011)

Healthy Worker Effects

Unhealthy Work Effect

<table>
<thead>
<tr>
<th>Total</th>
<th>Cancer</th>
<th>Lymphohematopoietic</th>
<th>Leukemia</th>
<th>Non-Hodgkin's Lymphoma</th>
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D DD D I D I D I D I D I D I
Risk Assessment, 2009

① Risk Scoping based on Systematic Check of Suspicious Problems
   – Before 2009, no compiled checklists of toxicity review
   – No cross-checking of MSDS information

② Assessment of Risk Potential of Suspected Problems
   – Workplace Exposure Measurements
   – Health Checkups

③ Management of Risks based on Comprehensive Assessments
   – Health and Safety Risk Awareness of CEO
## Risk Assessment Report, 2009

<table>
<thead>
<tr>
<th>Factory (Line)</th>
<th>Toxic Chemicals</th>
<th>Chemicals with Measurement Protocol</th>
<th>Chemicals Ever Assessed</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>Ki-Heung (5)</td>
<td>83</td>
<td>28</td>
<td>24</td>
</tr>
<tr>
<td>On-Yang (1)</td>
<td>63</td>
<td>16</td>
<td>14</td>
</tr>
</tbody>
</table>

- **Assessed Risks**: Limited in scope and depth
- **Assessment Target**: No Short-term Exposures
- **Assessment Time**: No Shift works
- **Assessment Cycle**: Sporadic and Non-systematic
H&S Management and Risk Assessment

• Employers’ Responsibility
  – Attitude of Employer toward H&S

• Based on best known practice
  – Attitude toward truth: How truth is determined?

• Documentation
  – Attitude toward unexplainable: How unexplainable is explained?

• With Participation
  – Attitude toward words and behaviors (Values)
Culture Analysis

• Organizational Culture
  – A pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way you perceive, think, and feel in relation to those problems

• Attitudes << Values << Assumptions
How truth is determined?

• Pure dogma based on tradition
• Revealed dogma by the authority or wise men
• Truth derived by a rational-legal process
• Truth as that which survives conflict and debate
• Truth as what which works, the purely pragmatic criterion
• Truth as established by scientific methods
2012. 3. 21.
Cancun, Mexico
ICOH Meeting
Samsungtomorrow
A few days later

Samsungtomorrow
How unexplainable is explained?

• Uncertainty
  – risk?
  – chaos?

• Contradiction
  – difference?
  – variation?

• Failure
  – evidence?
  – random error?
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<tr>
<th>News Articles on Internet</th>
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**"상실 반도체 근무환경 안전하다" [디지털시대 경제성장 단지] 2012년 3월 22일**

상실 전자는 21(현지시간) 텍사스 람 공장(Cancun)에서 열린 국제산업보건위원회(ICOH: The International Commission on Occupational Health) ...

**황 인비에른, 상실 반도체 안정성 조사결과 학술대회서 발표 < :: :: 환경 ...**

- 한국경제 - 3월 20일

상실 전자는 21(현지시간) 텍사스 람 공장에서 열린 국제산업보건위원회(ICOH) 학술대회에서 전대 및 인비에른 조사결과는 "상실 반도체 ...

**상실, 이전의 책임 회피 ... 파헤쳐 측 "고기일 수 없다" - 여성신문 - 2월 1일**

상실 전자는 지난 3월 22일(현지시간) 텍사스 람 공장에서 열린 국제산업보건위원회(ICOH) 학술대회에서 미국 인생보건 연구원 회사 인비에른이 방 안곤 ...

**인비에른, 상실 반도체 근무환경 조사결과" 발표 - 노컷뉴스**

- 노컷뉴스 - 2012년 3월 22일

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**웹문서**


ICOH Verifies “Samsung’s Safe Working Environment” | Flickr  
www.flickr.com/.../samsungtomor... - 저장된 페이지 - 이 페이지 방 안곤 21 Mar 2012 - 상실 반도체 근무환경 안전하다" 근무환경 조사결과, 국제산업보건 환경 ... 열 (현지시간) 텍사스 람 공장(Cancun)에서 열린 국제산업보건위원회(ICOH: ...) 이 페이지를 3분 방문했습니다. 허는 방문 날짜: 12. 3. 24
Current H&S Management Stage

• Truth dependent on Legislature
  – Legislature captured by Business

• Unexplainable left outside of Employers’ Responsibility
  – Casualties treated as a part of inevitable nature

• Correspondence between words and behaviors not checked
  – Participation without any meaningful contribution
Samsung EHS Program

• Chemical Registration
• Toxicity Review List
• Measurements
• Educations
• Medical Exams
• Accident Investigations etc, etc

Multidisciplinary Program, but not Systematic
Risk Factor Epidemiology vs Risk System Epidemiology
Risk Factor Epidemiology

- Risk Factors of Risk Factors Ignored

- Emergent Properties Not Covered

- Problem Solving Processes Not Envisioned
Semiconductor Industry Risk Factor Epidemiology

• Difficult to study with cutting-edge ever-changing new technologies
  – Risk Factors of Risk Factors Ignored

• Many Cases Associated with Irregularities (Accidents, Setups, Renovations)
  – Emergent Properties Not Covered

• Often regarded as not necessary to duplicate studies for the same factors
  – Problem Solving Processes Not Envisioned
Semiconductor Industry as a Risk System

• Some aspects of risk system is holding us back from recognizing risks properly, and from controlling those most deep rooted risk factors
  – Risk factor approaches sometimes have no answer or capacities to solve the problems of ever-changing and secretive semiconductor manufacturing industries.
  – Major risk factors are known risks since early 20th Century.
  – What is the real problem of ever-changing semiconductor industry?

• Why some, but not all, risk systems have solved the problem?
  Data ≠ Information ≠ Knowledge ≠ Wisdom
System of H&S (RISK) Management

- System for Data Generation
- System for Information Dissemination
- System for Knowledge Translation
- System for Action & Learning (Wisdom)
System Failure Stories

- No Feed-back Loop
  - not really equilibrated
  - not really delivering its mission
  - not really connected

- The management system of H&S should integrate four different functions,
  - generating measurement data,
  - organizing data into information for dissemination,
  - translating data into actions, and then
  - accommodating data requests in return,

thus having a full cycle of feedback system.
Accident don’t happen by accident!

- Accidents are caused.
  - Often on purpose. Purpose of pursuing only short-term interests.

- The lesson to learn from accident is how to avoid very short-term causes (greeds) by changing longer-term backgrounds (system).
  - It can only be achieved by installing long term interests into the system as a default
  - System building process starting from short-term causality, progressing to long-term causality

- Toolkit for challenging contradictions and deficiencies of current short-term oriented risk system

- Lack of Governmental Inspection
  - “Government capture by business” in political science term
Toolkit to overcome short-term orientation

• Toolkit for challenging contradictions and deficiencies of current short-term oriented risk system

• In doing so, we need right based approaches to make informed choices possible; raising questions possible; compensation possible; and changes possible
  – Right to know – political right for technical information
  – Right to raise social questions – basic social and economic rights
  – Right to be properly recognized – right for universal health
  – Right to change – human rights

• To make reporting possible, we need socio-economic safety nets such as minimum wages and social security benefits such that no harsh economic retaliation or economic discrimination is incurred.
Risk System Epidemiology

• Stories of Risk System Change
  – Equilibrated System - not easy to disrupt
  – Spontaneous Change unlikely unless Unsustainable Contradictions Found
  – Unsustainable Contradiction in Delivering its Missions, from demands to goals

• Risk Cognition Process of Alternatives
Risk-Cognition Process of Alternatives

• Cognition of Risks together with Alternatives
  – If no alternatives are deemed available, no risks are recognized.

• Alternatives are sought in sequence.
  -> the less difficult, the earlier
  – Technical
  – Managerial
  – Cultural
  – Post-cultural
Risk-Cognition Process of Alternatives

Risk Production → Alternatives

Excuses → Right Based Change Against Contradiction
## Rights for Contradicting Excuses

<table>
<thead>
<tr>
<th>Excuses</th>
<th>Contradictions</th>
<th>Rights</th>
<th>Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) My dog (product) doesn’t bite.</td>
<td>Chaos and Normal Variation</td>
<td>No toxicity data collected</td>
<td>Free Political Rights</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Technical</td>
</tr>
<tr>
<td>2) My dog bites, but it didn’t bite you.</td>
<td>Co-workers’ Fault</td>
<td>No proper Information studied</td>
<td>Fair Socio-Economic Rights</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Managerial</td>
</tr>
<tr>
<td>3) My dog bit you, but it didn’t hurt you.</td>
<td>Contributory Negligence</td>
<td>No valid Confoundings Controlled</td>
<td>Universal Health Rights</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cultural</td>
</tr>
<tr>
<td>4) My dog bit you, and hurt you, but it wasn’t my fault.</td>
<td>Assumption of Risk</td>
<td>Causality interpreted as Reversed</td>
<td>Just Human Rights</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Post-Cultural</td>
</tr>
</tbody>
</table>
It’s not about money. It’s about why my daughter had died. I have to know, and I have the right to know.