Communicable disease control in The Netherlands

China 2015 – 03-25

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TB still lurking in the shadows

As health caregivers mark World Tuberculosis Day, experts are calling for greater efforts to eradicate the disease and overcome the social stigma that still attached to it in some parts of China, says Wang Xiaodong reports.

Although the global battle against tuberculosis has made some progress, the disease still poses a serious threat to poor people, especially in rural areas, according to experts speaking ahead of World Tuberculosis Day, which falls on March 24.

They said there were fewer cases of tuberculosis (TB) in China, with TB rates falling in the eastern and central regions. However, there were still some areas where TB was endemic. In rural areas, there were also high rates of TB, especially in poverty-stricken areas.

Medical staff from hospitals in rural parts of China emphasize prevention and control of tuberculosis among residents. China has made progress in the fight against TB, but the disease continues to pose a threat to public health.

In addition to rapid diagnosis and standard treatment, improved disease management is the key to controlling patients with drug-resistant TB (MDR-TB). The new treatments can significantly reduce the risk of developing drug resistance, which is one of the main reasons for treatment failure.

A disease of poverty

According to WHO, tuberculosis is a disease of poverty. The high cost of treatment and the need for long-term treatment can be a financial burden for patients, especially in rural areas.

MDR-TB, a particularly dangerous form of the disease, occurs when the TB strain becomes resistant to at least one of the two main drugs used to treat TB. In recent years, drug-resistant tuberculosis has become a major public health problem in many areas, including China.

Free drugs and tests

To provide a larger number of patients with more financial support, the government has launched programs to treat MDR-TB as a major public health issue. The programs aim to increase access to treatment and reduce the burden of the disease on patients.

The eradication of TB is not just a task for the government, but also an important issue for the whole society. We should make every effort to fight against TB. The whole society is involved in this battle and all of us should contribute to its success.
TB still lurking in the shadows

As health campaigners mark World Tuberculosis Day, experts are calling for greater efforts to eradicate the disease and overcome the social stigma that’s still attached to it in some parts of China. Wang Xiaodong reports.
“In addition to rapid diagnosis and standardized treatment, improved disease management is the key to curing patients with MDR-TB.”

Chen Mingting, deputy head of the National Center for Tuberculosis Control and Prevention
The Netherlands
- Population: 17.500.000
- Surface: 41.500 km$^2$
  - 18,4% water
  $\rightarrow$ 420 inhabitants / km$^2$
- GNP: $700 \times 10^9$
- $35.000$ income per capita

- Expenditure on health 5000
  $\rightarrow$ percentage: 12% of GNP
  $\rightarrow$ 24% of modal income

- Life expectancy:
  - 78 years male
  - 81 years female
  - Increasing!
Morbidity and Mortality due to infectious diseases
Morbidity due to infectious diseases
The Netherlands
Hospital Admissions Infectious Diseases in 2010

• Total admissions:
  – 2,000,000
    • 2.4% (48,000) because of infectious diseases

• >1 day stay: 30,044
• 1 day stay: 17,960
• Relative most: 0-1 year of age
Mortality due to infectious diseases
The Netherlands
Total Mortality The Netherlands

- 135,000 per year
<table>
<thead>
<tr>
<th>ICD-Hoofdgroep</th>
<th>Mannen</th>
<th></th>
<th>Vrouwen</th>
<th></th>
<th>Totaal</th>
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<tbody>
<tr>
<td></td>
<td>absolút</td>
<td>%</td>
<td>absolút</td>
<td>%</td>
<td>absolút</td>
<td>%</td>
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<td>Nieuwvormingen</td>
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<td>19.832</td>
<td>28,3</td>
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<td>20.734</td>
<td>29,6</td>
<td>39.009</td>
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<td>6.356</td>
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<td>Psychische stoornissen</td>
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<td>5.351</td>
<td>7,6</td>
<td>7.617</td>
<td>5,6</td>
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<td>Ongevalletjes en vergiftigingen</td>
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<td>4,9</td>
<td>2.509</td>
<td>3,6</td>
<td>5.748</td>
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<td>Ziekten van het spijsverteringsstelsel</td>
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<td>3,9</td>
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<td>Symptomen en onvolledig omschreven ziektebeelden</td>
<td>2.349</td>
<td>3,6</td>
<td>2.877</td>
<td>4,1</td>
<td>5.226</td>
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<td>2.749</td>
<td>3,9</td>
<td>4.704</td>
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<td>Endocriene-, voedings- en stofwisselingsziekten en immuniteitsstoornissen</td>
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<td>2.044</td>
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<td>3.472</td>
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<td><strong>Infectieziekten en parasitaire ziekten</strong></td>
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<td><strong>1,5</strong></td>
<td><strong>1.094</strong></td>
<td><strong>1,6</strong></td>
<td><strong>2.104</strong></td>
<td><strong>1,5</strong></td>
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<td>Ziekten van het bewegingsstelsel en bindweefsel</td>
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<td>604</td>
<td>0,9</td>
<td>877</td>
<td>0,6</td>
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<tr>
<td>Aangeboren afwijkingen</td>
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<td>222</td>
<td>0,3</td>
<td>452</td>
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<td>Ziekten van huid en subcutis</td>
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<td>0,4</td>
<td>409</td>
<td>0,3</td>
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<tr>
<td>Aandoeningen ontstaan in de perinatale periode</td>
<td>200</td>
<td>0,3</td>
<td>156</td>
<td>0,2</td>
<td>356</td>
<td>0,3</td>
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<tr>
<td>Complicaties van zwangerschap, bevalling en kraambed</td>
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<td>0,0</td>
<td>4</td>
<td>0,0</td>
<td>4</td>
<td>0,0</td>
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<tr>
<td><strong>Alle doodsoorzaken samen</strong></td>
<td><strong>65.977</strong></td>
<td><strong>100,0</strong></td>
<td><strong>70.081</strong></td>
<td><strong>100,0</strong></td>
<td><strong>136.058</strong></td>
<td><strong>100,0</strong></td>
</tr>
</tbody>
</table>
Mortality Infectious Diseases 2010

- Total: 2104 death
  - 50% sepsis
- And: 5,775 due to diseases respiratory tract
- 10% of all mortality related to pneumonia
Mortality due to infectious diseases

• Incidence: 1 per 10,000 inhabitants/year
• 1/68 of mortality due to infections
Sterfte aan infectieziekten 2007-2010
per GGD-regio, gecorrigeerd voor leeftijd en geslacht

Afwijking van het landelijk gemiddelde
- lager dan gemiddeld (p < 0,01)
- lager dan gemiddeld (p < 0,05)
- niet significant afwijkend
- hoger dan gemiddeld (p < 0,05)
- hoger dan gemiddeld (p < 0,01)

Bron: CBS, gegevens bewerkt door het RIVM
Low morbidity and mortality due infectious diseases

• Why ?
How do *communicable* diseases arise?

How do communicable diseases arise?
Determinants, risk factors of communicable diseases

- Characteristics of:
  1. Host
  2. Agent
  3. Environment
  4. Transmission
  5. Vector
## Characteristics of Determinants / Risk factors of diseases

<table>
<thead>
<tr>
<th>Host (gastheer)</th>
<th>Agents (agens)</th>
<th>Environment (omgeving)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Interpersonal</td>
<td>2. Chemical</td>
<td>2. Climate</td>
</tr>
<tr>
<td></td>
<td>3. Physical</td>
<td>3. Social</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Preventive and curative health care</td>
</tr>
</tbody>
</table>
### Characteristics of determinants / risk factors of diseases

<table>
<thead>
<tr>
<th>Host</th>
<th>Agents</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Personal</strong></td>
<td>1. <strong>Biological</strong></td>
<td>1. <strong>Geographical</strong></td>
</tr>
<tr>
<td>• age</td>
<td>• germs</td>
<td>• height</td>
</tr>
<tr>
<td>• sex</td>
<td>• viruses</td>
<td>• longitude and latitude</td>
</tr>
<tr>
<td>• genetic profile</td>
<td>• parasites</td>
<td>• degree of urbanisation</td>
</tr>
<tr>
<td>• intelligence level</td>
<td>• yeasts</td>
<td>• population density/crowding</td>
</tr>
<tr>
<td>• disease history</td>
<td>• prions</td>
<td>• living surrounding</td>
</tr>
<tr>
<td>• immune status</td>
<td></td>
<td>• quality of housing</td>
</tr>
<tr>
<td>2. <strong>Inter-personal</strong></td>
<td>2. <strong>Chemical</strong></td>
<td>• biotope</td>
</tr>
<tr>
<td>• birth background</td>
<td>• alcohol</td>
<td>2. <strong>Climate</strong></td>
</tr>
<tr>
<td>• family background</td>
<td>• tobacco</td>
<td>• temperature</td>
</tr>
<tr>
<td>• religious status</td>
<td>• poison</td>
<td>• humidity</td>
</tr>
<tr>
<td>• marital status</td>
<td>• smoke</td>
<td>• hours of sunshine</td>
</tr>
<tr>
<td>• profession</td>
<td>• drugs</td>
<td>3. <strong>Social</strong></td>
</tr>
<tr>
<td>• hobbies</td>
<td></td>
<td>• polity (staatsbestel - good governance)</td>
</tr>
<tr>
<td>• culture and habits</td>
<td></td>
<td>• human including children rights</td>
</tr>
<tr>
<td>• life style</td>
<td></td>
<td>• freedom to believe and to not-believe</td>
</tr>
<tr>
<td>• psycho social surrounding</td>
<td></td>
<td>• freedom of thinking, knowing, and speech</td>
</tr>
<tr>
<td>• peer group</td>
<td></td>
<td>• right of possession (house, land, tools)</td>
</tr>
<tr>
<td>3. <strong>Physical</strong></td>
<td>3. <strong>Physical</strong></td>
<td>• availability and accessibility of education</td>
</tr>
<tr>
<td>• mechanical (trauma)</td>
<td>• radiation</td>
<td>• career opportunity</td>
</tr>
<tr>
<td>• fire</td>
<td>• fire</td>
<td>• work conditions</td>
</tr>
<tr>
<td>4. <strong>Nutrition</strong></td>
<td>4. <strong>Nutrition</strong></td>
<td><strong>socioeconomic status</strong></td>
</tr>
<tr>
<td>• quality</td>
<td>• quality</td>
<td>5. <strong>Preventive and curative health care</strong></td>
</tr>
<tr>
<td>• diversity</td>
<td>• diversity</td>
<td>• content</td>
</tr>
<tr>
<td>• availability</td>
<td>• availability</td>
<td>• quality</td>
</tr>
<tr>
<td>• lack</td>
<td>• lack</td>
<td>• availability, accessibility of affordability</td>
</tr>
<tr>
<td>• abundance</td>
<td>• abundance</td>
<td>• use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. <strong>Environmental health situation</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• indoor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• outdoor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• soil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• air</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• surface water</td>
</tr>
</tbody>
</table>
Law 2008: Public Health Care

- Environmental health care
- Health care for the elderly
- Health care for < 19 years of age
- Infectious disease control
Article 2.1

- Government of city responsible for:
  - Public health care
  - Cooperation between:
    - public health care
    - curative health care
    - disaster medicine
Artikel 6.1

• Government of city/municipality responsible for control of:
  – All infectious diseases dangerous for population
  – Tuberculosis
  – Sexual transmitted diseases
Model to control Community Diseases

Science

Knowledge about determinants and measures

Public Health Practice

Application of measures to control communicable diseases

Research

Surveillance

Epidemiology

Outbreak management
Surveillance: General principle

Health Care System

Event

Real world! ... expected changes

Intervention

Data

Analysis & Interpretation

Decision (Feedback)

Public Health Authority

Reporting
Outbreak Management

Starts with reporting of any possible dangerous infectious diseases
Law on infectious disease control

The Netherlands:

• All citizen have the human right of authonomy
• Government has the power to overrule authonomy of citizens
  suffering from infectious diseases
  dangerous for other authonomous citizens
Law on infectious disease control

• Duty of reporting any infectious disease dangerous for public health:
  – Doctors
  – (Health) care institutes
  – Laboratories
Reporting towards:

- Municipal Health Institute:
  - responsable for outbreak management
Reportable diseases

Categories:
- A
- B1
- B2
- C
Category A

1. Poliomyelitis
2. SARS (Severe Acute Respiratory Syndrome)
3. Small pox (variola major en minor)
4. MERS-coronavirus
5. Viral hemorragic fever
Category B1

1. Any possible new type of influenza originating in animals
2. Pestis
3. Tuberculosis
4. Diphteria
5. Rabies
1. Typhoid fever
2. Cholera
3. Hepatitis A, B en C
4. Pertussis
5. Measles
6. Paratyfus
7. Rubella
8. Shigelllose
9. Shiga toxine producing escherichia (STEC)
10. Enterohemorrhagic escherichia coli-infection (EHEC)
11. Invasive Streptococci A
12. Food poisoning
Category C

1. Antrax
2. Mumps
3. Botulism
4. Brucellosis
5. Yellow fever
6. Hanta virus
7. Haemophilus Influenza infection (type B)
8. Pneumococci disease
9. Legionellosis
10. Leptospirosis
11. Listeriose
12. Malaria
13. Meningococcal disease
14. MRSA-infection
15. Ppsittacosis
16. Q-fever
17. Tetanus
18. Trichinosis
19. West Nile virus infection
20. Creutzfeldt-Jacob disease
Groep C:

Dwingende maatregelen kunnen niet opgelegd worden. Maar melding en persoonsgegevens zijn nodig om de inzet van vrijwilligers/te adviseren maatregelen rondom de patiënt of anderen in de gemeenschap mogelijk te maken.

- Antrax
- Bof
- Botulisme
- Brucellose
- Ziekte van Creutzfeldt-Jakob (klassieke)
- Ziekte van Creutzfeldt-Jakob (variant)
- Gele koorts
- Invasieve Haemophilus influenzae type b-infectie
- Hantavirusinfectie
- Legionellose
- Leptospirose
- Listeriose
- Malaria
- Meningokokkenziekte
- MRSA-infectie (clusters buiten het ziekenhuis)
- Invasieve pneumokokkenziekte bij kinderen t/m 5 jaar
- Psittacose
- Q-koorts
- Tetanus
- Trichinose
- West-Nilevirus
# Notification Form

Formulier voor de melding van infectieziekten
(het formulier dient volledig door de arts te worden ingevuld)

Ondergetekende bericht hierbij bij genoemde patiënt een ziekte als genoemd in de Wet publieke gezondheid te vermoeden dan wel te hebben vastgesteld.

<table>
<thead>
<tr>
<th>Field</th>
<th>Details</th>
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<tbody>
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<td>Formulier ingevuld d.d.</td>
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</tr>
<tr>
<td>Handtekening (arts)</td>
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</tr>
<tr>
<td>Naam, specialismo, praktijkadres en telefoonnummer (in blokletters, bij voorkeur stempel)</td>
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</tr>
<tr>
<td>Naam en voornamen van de patiënt</td>
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<tr>
<td>Geslacht</td>
<td>man / vrouw*</td>
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<tr>
<td>Geboortedatum</td>
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<tr>
<td>Adres</td>
<td></td>
</tr>
<tr>
<td>Postcode en woonplaats</td>
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<tr>
<td>Burger Service Nummer patient</td>
<td></td>
</tr>
<tr>
<td>Verblijfplaats betrokken persoon (indien afwijkend van huisadres)</td>
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<tr>
<td>Infectieziekte</td>
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<tr>
<td>Vaststelling diagnose</td>
<td>serologisch / aantonen verwekker / klinisch / epidemiologisch*</td>
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Result of Notification
Definitieve meldingen groep A
2001 - 2007 vanwege de Infectieziektewet

<table>
<thead>
<tr>
<th></th>
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<td>-</td>
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<tr>
<td>SARS (Severe Acute Respiratory Syndrome)</td>
<td>b</td>
<td>b</td>
<td>b</td>
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<tr>
<td>Pokken</td>
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## Definitieve meldingen groep B
### 2001 - 2007 vanwege de Infectieziektewet

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<td>348</td>
<td>415</td>
<td>268</td>
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<td>Botulisme</td>
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<td>-</td>
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<td>1</td>
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<td>Buiktyphus</td>
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<td>Cholera</td>
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<td>1</td>
<td>4</td>
<td>3</td>
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<td>14</td>
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<td>18</td>
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<tr>
<td>Ziekte van Creutzfeldt-Jakob – variant</td>
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<td>1</td>
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<td>Difterie</td>
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<td>-</td>
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<tr>
<td>Febris recurrens</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>701</td>
<td>430</td>
<td>371</td>
<td>443</td>
<td>222</td>
<td>258</td>
<td>168</td>
</tr>
<tr>
<td>Hepatitis B</td>
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<td>1.858</td>
<td>1.880</td>
<td>1.817</td>
<td>1.856</td>
<td>1.807</td>
<td>1.819</td>
</tr>
<tr>
<td>- waarvan acuut</td>
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<td>281</td>
<td>309</td>
<td>282</td>
<td>267</td>
<td>224</td>
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<tr>
<td>Hepatitis C Acuut*</td>
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<td>12</td>
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<td>30</td>
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</tr>
<tr>
<td>Hepatitis C Acuut en Drager*</td>
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<td>424</td>
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## Definitieve meldingen groep C
2001 - 2007 vanwege de Infectieziektewet

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* vanaf 1-10-2003 is uitsluitend de acute vorm van hepatitis C meldingsplichtig
** aantallen afkomstig van KNCV Tuberculosefonds
*** vanaf 2001 worden explosies als geheel gemeld achter 1 indexpatiënt (daarvoor alle individuele ziektegevallen in een explosie)
door een iets andere selectie wijkt het aantal in de tekst (93) iets af van de tabel (100)

*a* voorlopig cijfer, definitieve aantal 2007 nog niet bekend
*b* niet meldingsplichtig in betreffende jaar
Infectious disease control: 7 REGIONS

7 GGD-regions for:

1. Director’s meeting
2. Provincial Meeting for Infectious Disease Control
3. Backoffice for TBC
4. Organisation curative STD
5. Backoffice for environmental health
6. Future: General public health
Organisation of surveillance reporting system (1/3)

- GP
- Specialist
- Laboratory
- Institution (art. 7)

Reporting by E-mail, form or phone

GGD (MHS)
Epidemiological investigation
Control measures
Organisation of surveillance reporting system (2/3)

- GP
- Specialist
- Laboratory
- Institution (art. 7)

Reporting by E-mail, form or phone

GGD (MHS)
Epidemiological investigation
Control measures

- Infectious Disease control decentralized to municipalities (n= 443)
- Major responsible for isolation, compulsory admission enforced diagnostics, quarantine, prohibition on practicing profession
- GGD advices the major
Organisation of surveillance reporting system (3/3)

- GP
- Specialist
- Laboratory
- Institution (art. 7)

Reporting by E-mail, form or phone

GGD (MHS)
Epidemiological investigation
Control measures

Osiris, internet application

Centre of Infectious Disease Control (RIVM)
RIVM:
National Institute of Public Health and The Environment
OMT = Outbreak Management Team
BAO = Bestuurlijk Afstemmings Overleg:
   = Governmental Coordination Meeting
IBT = Interdepartemental Policy Team
Determinants of infectious diseases and the possible target for control

Agent

Transmission

Host

Environment

Reservoir of agent

Source of agent

Direct and indirect transmission routes of agent

Susceptibility and defense of host against agent

Place of exit of agent

Place of entry of agent

- No infection

- Asymptomatic infection

- Infection and disease

- Infection, disease and death

- Infection, disease and recovery

7 targets to control infectious diseases
<table>
<thead>
<tr>
<th>Triad</th>
<th>Interventions</th>
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</table>
| 1. **Agent and its reservoir and source** | 1. Disinfection, heating, cooking, chlorination  
2. Safe food and drinking water  
3. Sewage system, garbage control  
4. Destruction of rats, no swimming in infected surface water  
5. Air cleaning  
6. House hygiene and cleaning  
7. Destruction of infectious animals and poultry  
8. Disinfection of manure  
9. Antibiotics or antivirals for infectious hosts (meningitis)  
10. Eradication of agent through worldwide vaccination of humans (small pox, poliomyelitis, Hepatitis B, measles) |
| 2a. **Transmission without vector** | 1. **Hygiene:**  
• hand washing, body hygiene, washing clothes  
• cleaning of living surrounding (house, stable, city, hospital)  
2. **Technical hygiene:**  
masks, spectacles, protecting clothing, condoms, air tight stables.  
3. **Epidemiological measures** (counter transmission between groups of human hosts):  
staying at home, closing schools, cancelling large gatherings of humans, evacuation, cohort nursing  
4. **Source and contact tracing among hosts**, followed by **isolation of infectious hosts** and **quarantining of contacts** of infectious hosts. |
| 2b. **Transmission via vector** | **Vector control:**  
• impregnated bed nets  
• insecticides, biological control  
• skin applications (deet)  
• lowering of surface tension (kerosene)  
• import stop (bamboo with mosquito’s, dengue)  
• control of rabies among dogs and foxes |
| 3. **Host** | 1. **Primary prevention:**  
• resistance due to healthy life style  
• vaccination  
passive: immunoglobulins  
active: antigens  
• post-exposure prophylaxis: active and passive  
2. **Secondary prevention:**  
• screening of populations with mail and letters (chlamydia)  
• case finding (family doctor)  
3. **Tertiary prevention:**  
• Treatment with antibiotics and antivirals |
Thank you for your attention