Coping in a World without Antibiotics: How to protect a precious resource?

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The Arrival of the Miracle Drugs in Asia

- British general hospital, Bangalore, India:
  - British soldier with infected cavernous sinus thrombosis and septicaemia: “we tried everything, to no avail”

- Institute of Science and Technology, Bangalore:
  - Biochemist prepared a flask “of what looked like porridge that they claimed was penicillin”

- Intramuscular injection of “the stuff”:
  - The next morning the patient asked for tea!

Morris, J R Army Med Corps 1945; 85: 123-32
Total Outpatient Antibiotic Use in DID in 31 European Countries in 2009

Source: ESAC 2010

* Total care : LT, CY
MT : 2008 data
No statistical Differences in Recovery between those Prescribed Antibiotics and Those Not Prescribed Antibiotics CA-LRTI (survival analysis)

Butler et al., BMJ 2009
Correlation Between Penicillin Use and Prevalence of Penicillin-resistant *S. pneumoniae*

Consumption of Penicillin (J01C) in DID, AC 2000

<table>
<thead>
<tr>
<th>Organism year of isolation [source of information]</th>
<th>Antibiotic resistance</th>
<th>Antibiotic use - ATC group (year of data)</th>
<th>No. of countries</th>
<th>Spearman correlation (r) (confidence interval)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>S. pneumoniae</em> 2001 [7]</td>
<td>Penicillin</td>
<td>Penicillin – J01C (2000)</td>
<td>19</td>
<td>0.84 (0.62-0.94)</td>
<td>&lt;0.001</td>
</tr>
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Goossens et al., Lancet 2005; 365: 579-87
K. pneumoniae: Proportion of Invasive Carbapenem Resistant Isolates, 2009

Source: EARS-Net 2010
Emergence of NDM-1 Producing Enterobacteriaceae in Europe

- ECDC conducted a questionnaire survey in all EU Member States, Iceland and Norway
- By 4 October 2010, a total of 77 cases were reported from 13 countries in 2008-2010

Struelens M et al, Euro Surveill, November 2010
• Antibiotic sales in the community represent > 90% of all antibiotic use and is, therefore, an important component in the selection pressure

• The largest use of these antibiotics is towards minor respiratory tract infections which are often self-limiting and self-healing and for which AB real usefulness is dubious
  - pharyngitis
  - bronchitis
  - flu-like syndrome, ...

• Antibiotic use will select for antibiotic resistance
Prudent use of antimicrobials: only when needed, correct dose, intervals and duration

Infection prevention and control: hand hygiene, masks and gloves, screening isolation

New antibiotics: with a novel mechanism of action, research and development
Belgian National Public Campaigns

- **When:** since November 2000, annually during winter season
- **Organised by:** BAPCOC (Belgian Antibiotic Policy Coordination Committee)
- **Budget:**
  - 400,000 EUR/annual campaign
- **Interventions targeting the public:**
  - Ads on TV, radio and newspaper
  - Information booklets
  - Folders
  - Posters
  - Internet campaigns: www.antibiotics-info.be
BAAT HET NIET, DAN SCHAKELT HET WEL.

Tijdens zwangerschap
Antibiotica zijn aan te raden bij infecties als: • penicilliematos of penicillium notatum • endocarditis. De behandeling moet worden gestart met een effectieve antibioticum. Bij een extreme mate van ernst is een operatie (transplantatie van een gedeeltelijke hartvleugel) het enige effectieve behandeling.

Waterzorg en antibiotica in de vroeggeboren!
Antibiotica zijn zeer effectief bij waterzorg. Tijdens de eerste vier weken na een kinderdrager of een kinderdrager die is geboren via Sectio werden antibiotica gegeven.

Infektiën zoals griep, bronchitis en een infectieus ontstekingsziekte zorgen voor de resistentie tegen antibiotica. De behandeling moet worden gestart met een effectieve antibioticum. Bij een extreme mate van ernst is een operatie (transplantatie van een gedeeltelijke hartvleugel) het enige effectieve behandeling.

Belangrijkste geneesmiddelen
Belangrijkste antibiotica zijn: • penicillium • streptococci • staphylococcus • enterococci • streptococcus • enterococcus • streptococcus • enterococcus. De behandeling moet worden gestart met een effectieve antibioticum. Bij een extreme mate van ernst is een operatie (transplantatie van een gedeeltelijke hartvleugel) het enige effectieve behandeling.

Wat is resistente?
OPGELET: ALLEEN GEBRUIKEN INDIEN NODIG

Gebruik antibiotica ook alledraad
als het nodig is

www.gebruikantibioticacorrect.be

18 November
Een Europees gezondheidsinitiatief

PLEASE NOTE: ONLY USE WHEN NECESSARY.

ANTIBIOTICS DON'T HELP WITH THE FLU, BRONCHITIS OR A COLD.
Belgian Campaigns 2002-2010
Outpatient antibiotic use in Belgium in packages per 1,000 inhabitants per day – July - June

![Diagram showing outpatient antibiotic use in Belgium from 1997 to 2010, with percentage changes for different antibiotic classes.]
Belgian Campaigns 2002-2007
Outpatient antibiotic Use in Belgium in EUR, January - December

<table>
<thead>
<tr>
<th>Year</th>
<th>State</th>
<th>Patients</th>
<th>Total EUR (million)</th>
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<td>1997</td>
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<td>2006</td>
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Antibiotic Resistance of *S. pneumoniae* in Belgium 1985 - 2009

National Reference Centre *S. pneumoniae* (University Leuven)
Conclusions

- National public campaigns have been very successful to reduce antibiotic use and resistance in Belgium and France
- Huge cost savings: for 1 € invested, about 8 were saved
  - Belgium: 250 million EUR 2000-2010
  - France: 845 million EUR 2002-2010
- Decrease of antibiotic use amplified by the effect of the 7 valent conjugated pneumococcal vaccine
- In both countries actions were also directed towards the prescribers:
  - academic detailing
  - distribution of guidelines
  - individual feed-back of antibiotic prescriptions
  - promotion of streptococcal antigen tests (only France)

The burden of antibiotic resistance warrants a multifaceted approach
EUROPEAN ANTIBIOTIC AWARENESS DAY

A European Health Initiative
Images from national campaigns: Belgium, Cyprus, Poland, England, Luxembourg, Greece
EAAD, 2008-2011

2008
Materials for general public
32 countries participated

2009
- Article in Eurosurveillance
- Materials for primary care prescribers
- Website translated in all EU languages, three TV spots developed
- 34 countries participated

2010
- 36 countries participated
- Materials for hospital prescribers
- Matched Get Smart week in the United States and the campaign in Canada
Prudent use of antimicrobials:
only when needed, correct dose, intervals and duration

Infection prevention and control:
hand hygiene, masks and gloves, screening isolation

New antibiotics:
with a novel mechanism of action, research and development
FIRST GLOBAL PATIENT SAFETY CHALLENGE

To reduce health care-associated infections

Hand hygiene as the cornerstone
"The 5 Moments of Hand Hygiene"

1. **Before touching a patient**

2. **Before clean/aseptic procedure**

3. **After body fluid exposure risk**

4. **After touching a patient**

5. **After touching patient surroundings**

Sax et al, J Hosp Infect 2007;67:9-21
Hygiène des mains

Quand ?

Les 5 indications

AVANT contact patient

1

AVANT acte propre/invasif

3

APRES contact patient

2

APRES exposition aux liquides biologiques

4

APRES contact avec l’environnement du patient

5

En cas de souillures visibles, se laver les mains, les sécher puis les désinfecter avec la solution hydro-alcoolique.
Methodology: Two components

1. Awareness campaign with standardised material to improve Hand Hygiene compliance distributed to participating institutions

2. Measuring impact of the campaign
   - Hand Hygiene compliance (soap and/or alcohol / Hand Hygiene opportunities)
   - Alcohol rub consumption (liter alcohol rub / 10,000 patient days)
   - Respect of basic hygiene conditions (optional, only 3rd campaign)
Planning of Campaigns

**First campaign:** 2005
**Second campaign:** 2006-2007
**Third campaign:** 2008-2009
**Fourth campaign:** 2010-2011

**During 1 month**
- Invitation to participate
- Measurement of Hand Hygiene indicators

**1 month later and for 1 month**
- Awareness Campaign + press conference

**1 month later and for 1 month**
- Measurement of Hand Hygiene indicators

**9 months later - Post-campaign**
- National Feedback session

**Process:**
1. Invitation to participate
2. Measurement of Hand Hygiene indicators
3. Awareness Campaign + press conference
4. Measurement of Hand Hygiene indicators
5. National Feedback session
Awareness Campaigns: Multi Modal

- Reminders (posters) in accordance with the WHO guidelines
- Education of Healthcare workers
  - Standardised powerpoint presentation
  - Interactive quiz
- Distribution of gadgets for Healthcare workers or patients
- Promotion of hand rub (posters, black light)
- Implication of patients (leaflets, gadget)
- Feedback of measurement results before and after campaign
Distribution of Average Hand Hygiene Compliance

- 1st campaign (2005): 48% before, 68% after, +20%
- 2nd campaign (2006): 54% before, 69% after, +16%
- 3rd campaign (2008): 58% before, 69% after, +11%

N hop
- n=148
- n=127
- n=178
- n=158
- n=168
- n=145

Before campaign | After campaign
MRSA in Belgian acute care hospitals: proportion of *S. aureus* clinical isolates and incidence of nosocomial acquisition

1994 - 2009

Source: National surveillance, B. Jans

Mean of rates in cohort of hospitals with min. 5 participations since 1994
Conclusion: Campaigns Were Successful

- High participation rate (about 80% of hospitals)
- Increase of Hand Hygiene compliance at short and long term
- Alcohol rub widely used

Key factors for success:
- Multi modal awareness campaign
- Repetition of campaign
- National implication
- Political and financial support
Counts of MRSA bacteraemia
Oct 2005 to June 2009

* DATA ARE PROVISIONAL NOT FOR WIDER CIRCULATION

BBC World news

A. Pearson and colleagues (HPA, Sept 2009)
% MRSA and incidence per 100 admissions or 1000 days of hospitalisation. Univ. hospitals of Paris (n=39) 1993-2007

V. Jarlier, D. Trystram 2008
Many Success Stories in Europe: 
MRSA Bacteraemia Trends in Europe, 2007

Country code (average number of isolates reported per year) & year of start surveillance

% MRSA
1999
2000
2001
2002
2003
2004
2005
2006
2007

* Courtesy: Grundmann et al. (EARSS)
Expert-Proposed European Strategies to Monitor and control Infection, Antibiotic Use and Resistance in Health-care Facilities

- Initiate or continue hand hygiene campaigns and use hand hygiene as a quality indicator
- ECDC Point Prevalence Surveys on HAI and AB Use (completed in all Member States by November 2012; repeated at least once every 5 years)
- Collection and monitoring of structure-of-care quality indicators and indicators of good practice (e.g. consumption of alcohol solution)
- National LTCF resident safety programmes, external audits of LTCF and monitoring

Goossens, Lancet Infect Dis 2011, April 7th
How to Protect a Precious Resource?

Prudent use of antimicrobials: only when needed, correct dose, intervals and duration

Infection prevention and control: hand hygiene, masks and gloves, screening isolation

New antibiotics: with a novel mechanism of action, research and development
15 novel, systemically administered antibacterial agents in the pipeline

13 agents against Gram-positive bacteria

6 agents against Gram-negative bacteria

We Need Better Rapid Point-of-Care Tests

- POCTs enhance surveillance of pathogens and infectious diseases:
  - e.g. H1N1 flu pandemic

- POCTs support rapid initiation and cessation of treatment:
  - Sepsis is associated with 7% increased mortality for every hour delay in the administration of appropriate antibiotics (Kumar et al, CCM 2006).

- POCTs decrease the size and cost of antibacterial clinical trials:
  - We URGENTLY need new antibiotics (ECDC/EMA report 2009)
Why did Industry and Academia Fail?

Can you imagine the challenges of shrinking a huge laboratory filled with people and equipment onto a single chip the size of a matchbox?

Neither industry, nor academia can do this on their own!

Ziober et al. Head Neck 2008
The EU-US Summit Declaration called for the establishment of “…a transatlantic task force on urgent antimicrobial resistance issues focused on appropriate therapeutic use of antimicrobial drugs in the medical and veterinary communities, prevention of both healthcare- and community-associated drug-resistant infections, and strategies for improving the pipeline of new antimicrobial drugs, which could be better addressed by intensified cooperation between us”.
And Now....
World Health Day, 7 April, 2011

COMBAT DRUG RESISTANCE

No action today, no cure tomorrow
“We have watched too passively as the treasury of drugs that has served us well has been stripped of its value. We urge our colleagues worldwide to take responsibility for the protection of this precious resource. There is no longer time for silence and complacency”.

Carlet et al, Lancet Infect Dis, 2011; April 7th
Acknowledgement

• All my colleagues in BAPCOC, particularly Anne Simon
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• Dominique Monnet and Sarah Earnshaw of ECDC, Stockholm
My Congratulatory Message

- You managed to control successfully H5N1 in Hong Kong
- With similar efforts and commitments you will also be able to protect this precious resource of antibiotics