Global Antibiotic Resistance Partnership

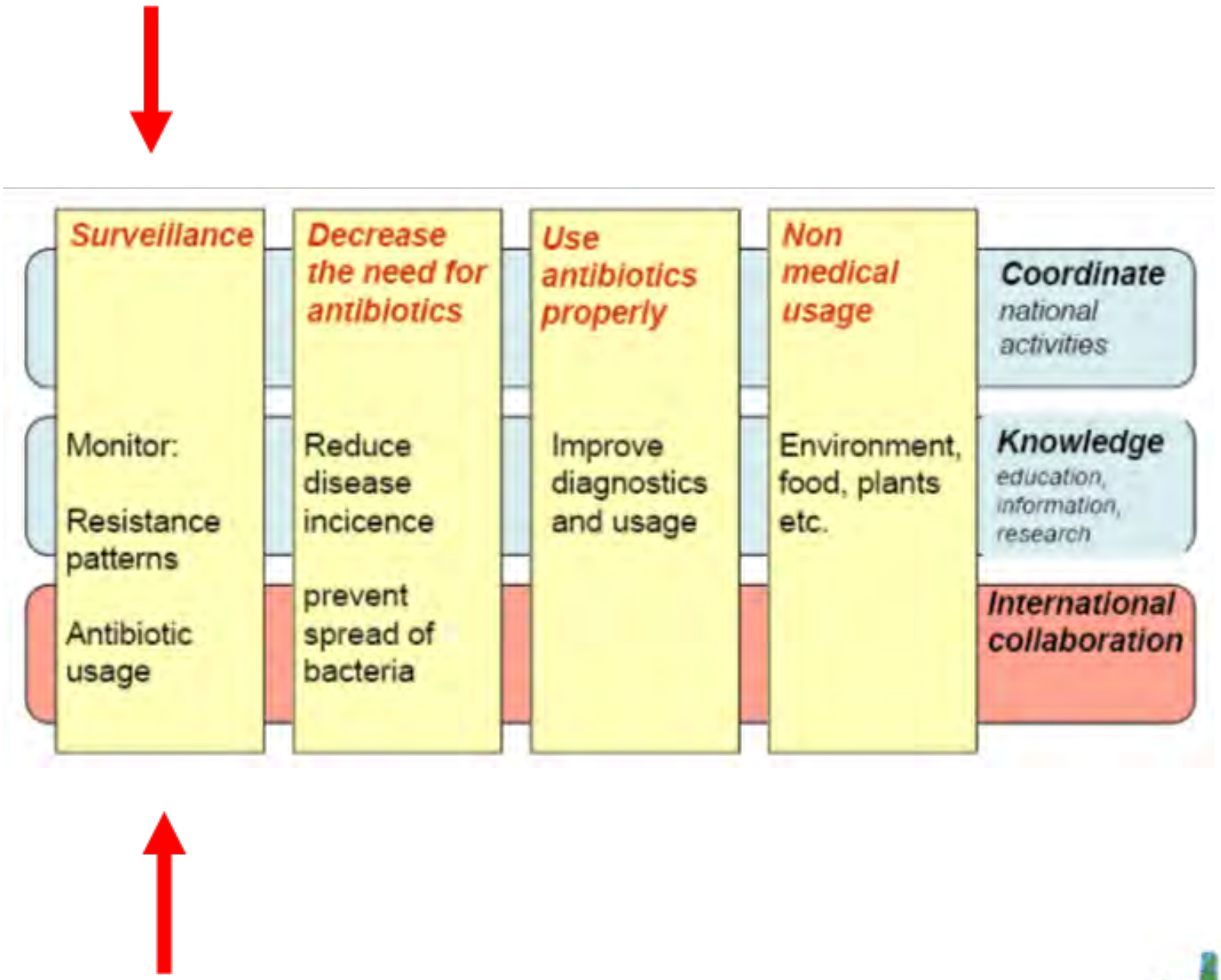
CDDEP THE CENTER FOR Disease Dynamics, Economics & Policy
WASHINGTON DC • NEW DELHI

Antibiotic Consumption and Resistance Surveillance. What can we do in Vietnam?

Heiman Wertheim, MD PhD

1st GARP meeting
4-5 September 2009
Hanoi, Viet Nam

Global Antibiotic Resistance Partnership



Source:
ReAct

Why survey both?

- Antibiotic consumption:
  - main driving force for development of resistance
  - Surveillance provides data to implement interventions
  - Hospital, community, agriculture

- Antibiotic resistance
  - Monitor of prescribing practices and interventions
  - Early warning of important resistance trends
  - Helps prescribers to give the right antibiotic
  - Hospital, community, agriculture

Examples of surveillance systems

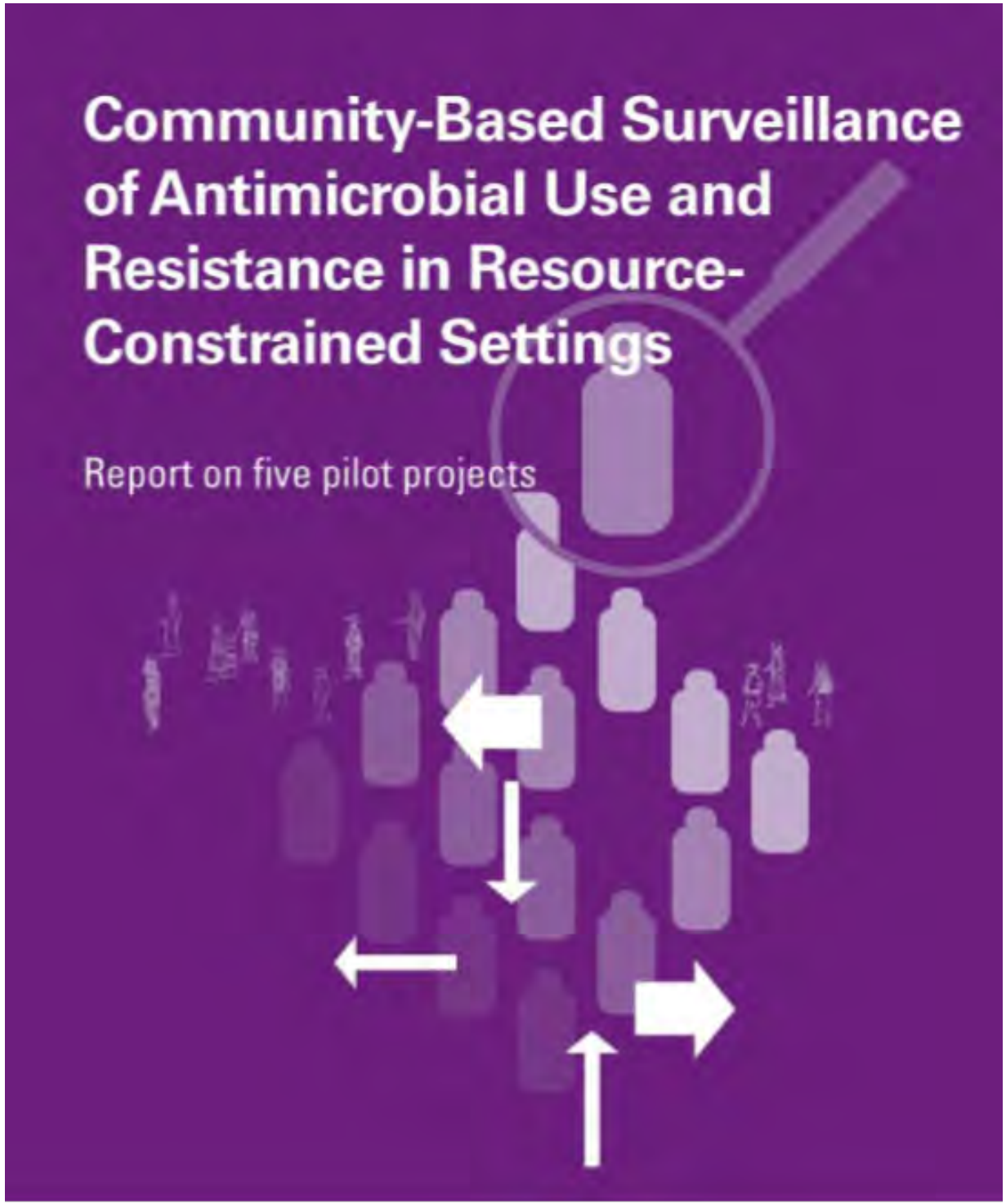
- Nethmap (www.swab.nl)
- European Antimicrobial Resistance Surveillance System EARSS (http://www.rivm.nl/earss)
- European surveillance of antimicrobial consumption ESAC (http://app.esac.ua.ac.be)
- Community-Based Surveillance of Antimicrobial Use and Resistance in Resource-Constrained Settings (http://www.who.int/medicines/publications/who_emp_2009.2/en/index.html)

Global Antibiotic Resistance Partnership

NETHMAP 2008

Consumption of antimicrobial agents and
antimicrobial resistance
among medically important bacteria
in the Netherlands

Global Antibiotic Resistance Partnership



Download at:

http://www.who.int/medicines/publications/community_based_may09.pdf

Global Antibiotic Resistance Partnership

Importance

About 70 % of the bacteria causing neonatal sepsis in the developing world can not be treated with the antibiotics recommended by WHO….

Lancet 2005; 365: 1175–88

Global Antibiotic Resistance Partnership

Colistin example

- Patients on Vietnamese ICU with multi-resistant bacterial infection
- Treatment would be Colistin
- But colistin NOT available for human use, but is being used in aquaculture…
- Good surveillance can identify these issues

Global Antibiotic Resistance Partnership

Antibiotic use surveillance

- Should be simple and feasible
- Good quality data needed
- Cover hospital, community, food production
- Standardized data collection to make comparisons possible (DDD/1000 patient days)
- Timely collection and reporting

- <u>What antibiotic use data are available in Vietnam?</u>

ESAC system

- ESAC data from distribution or reimbursement systems:
  - sales data from wholesalers or drug agency (ministry of health)
  - reimbursement data from insurance companies
  - consumption expressed in defined daily doses (DDD) according to WHO Guidelines
  - Use of ABC calculator developed by Staten Serum Institute, Denmark

- If possible get data for:
  - Hospitals
  - Community
  - Health stations
  - Veterinary
  - Agriculture/aquaculture
  - Other……??

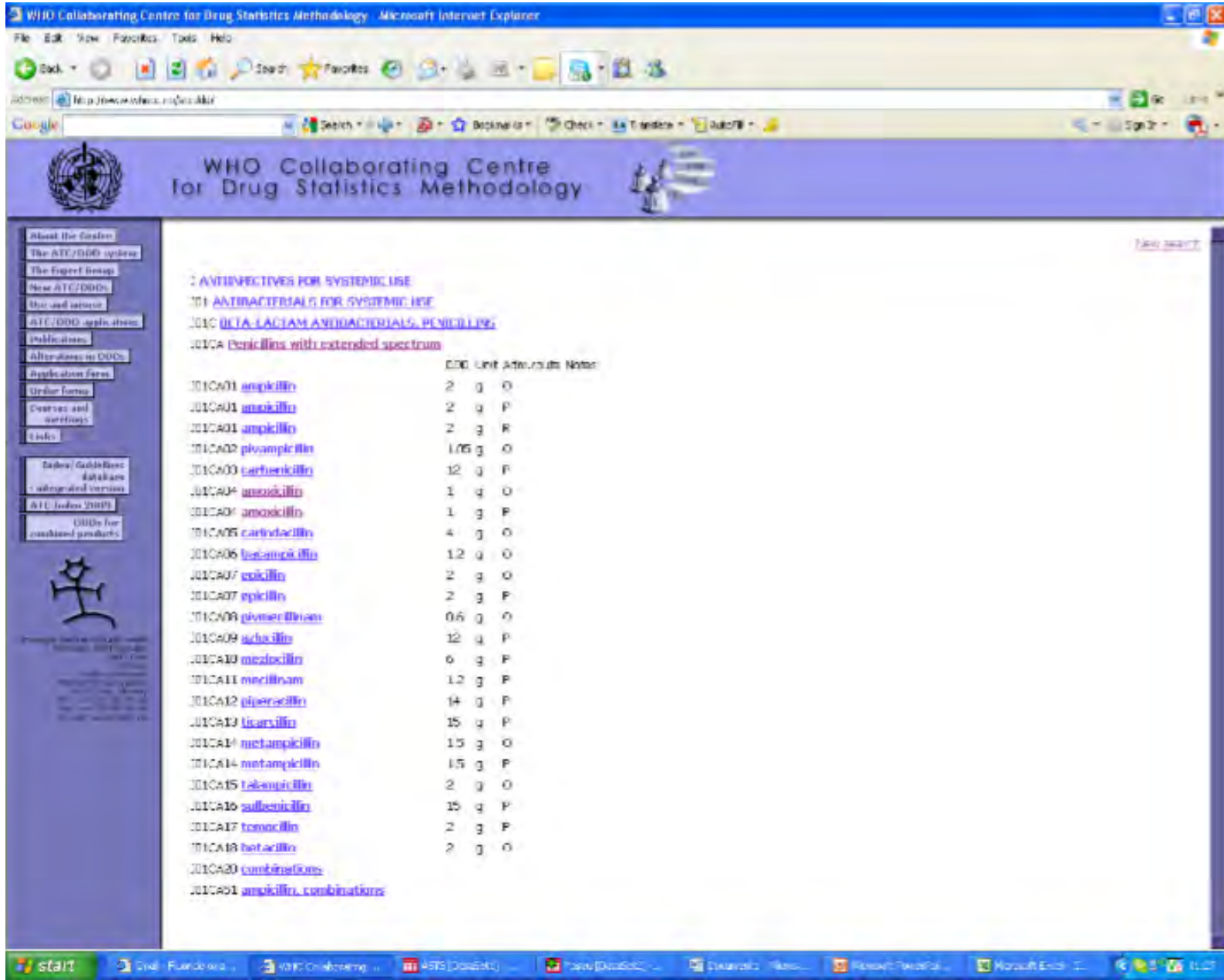
- What data is registered in Vietnam?

Global Antibiotic Resistance Partnership

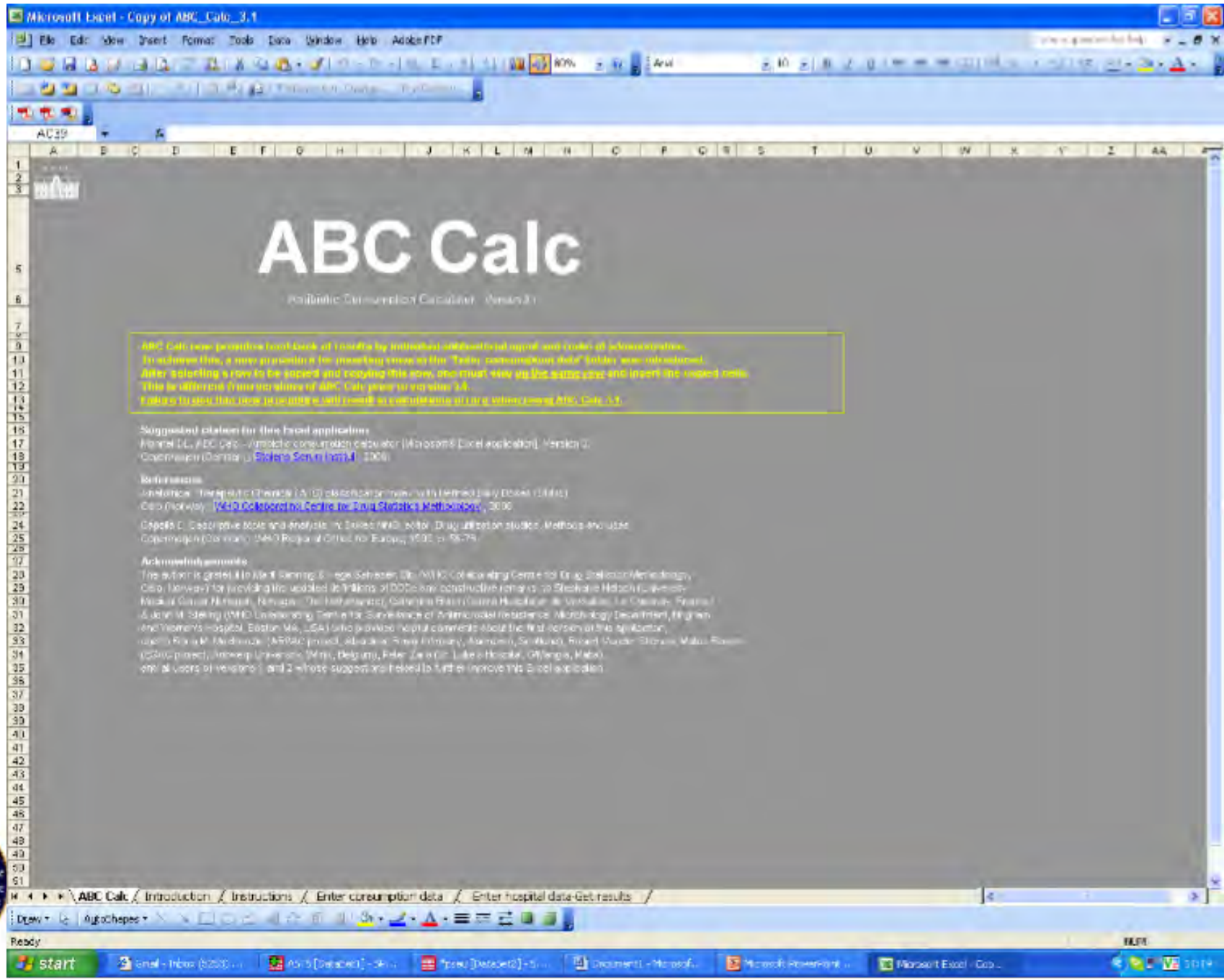
What is DDD?

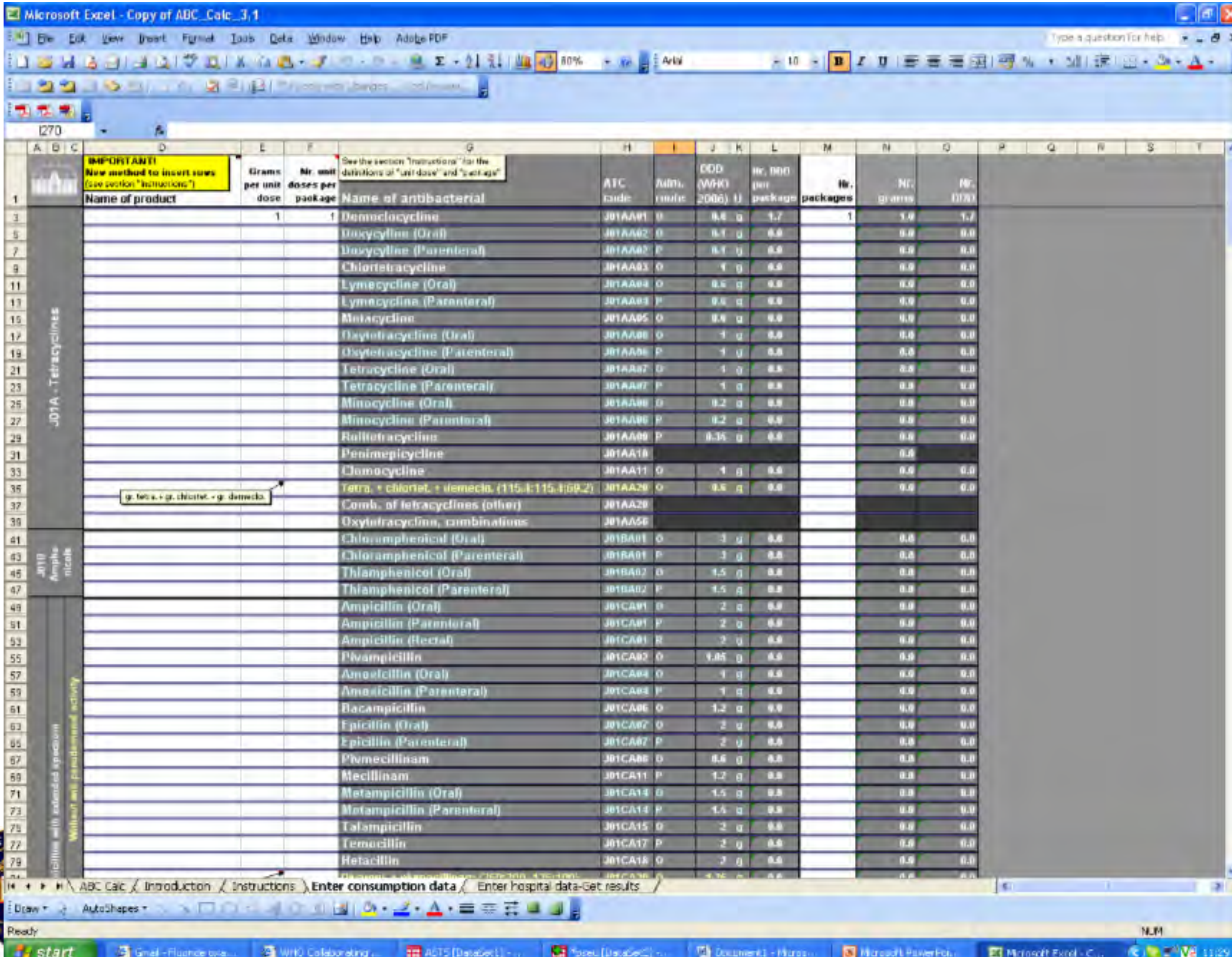
- DDD=defined daily dose
- The DDD theoretically corresponds to the average daily maintenance dose for a drug's major indication.
  - For example: vancomycin's dosage is usually 1 g every 12 hours; therefore, the DDD for vancomycin is 2 g.
- denominator measurement is usually 1000 patient-days or 100 bed-days.
- Developed by WHO, available from www.whocc.no/atcddd
- ABC calculator to calculate AB consumption rates in the hospital with pharmacy data

www.whocc.no/atcddd

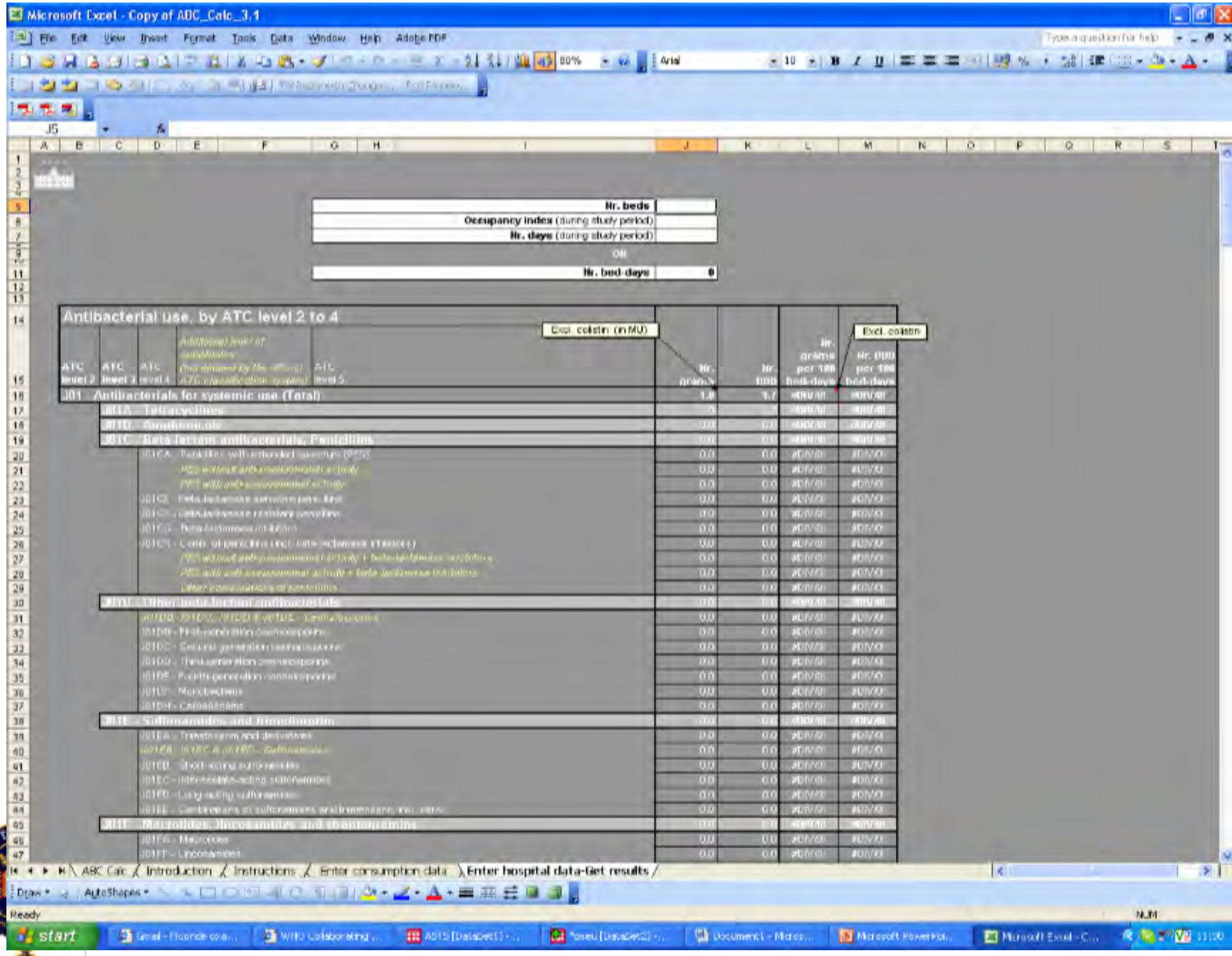


Global Antibiotic Resistance Partnership

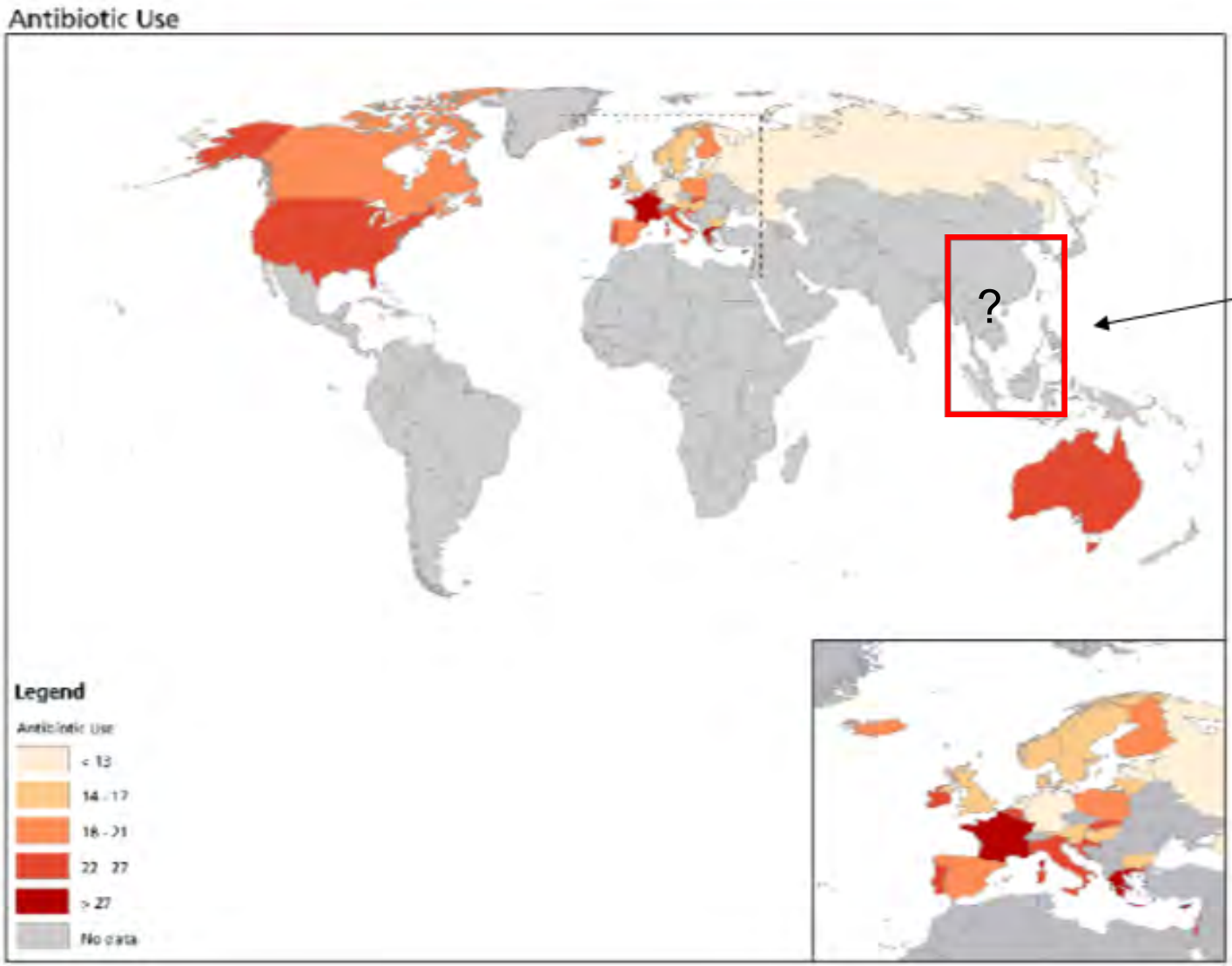

Microsoft Excel - Copy of ABC_Calc_3.1
ABC Calc
Antibiotic Consumption Calculator (Version 3.1)
ABC Calc now provides text-book of results by individual antibacterial agent and route of administration.
To achieve this, a new procedure for inserting rows in the 'Enter consumption data' folder was introduced.
After selecting a row to be copied and copying this row, one must now go the same row and insert the copied cells.
This is different from previous of ABC Calc prior to version 3.1.
Failure to use this new procedure will result in calculations errors when viewing ABC Calc 3.1.
Suggested citation for this excel application:
ABC Calc - Antibiotic consumption calculator [Microsoft Excel application]. Version 3.1.
Copenhagen (Denmark): Statens Serum Institut; 2009.
References
Anatomical Therapeutic Chemical (ATC) classification index with Defined Daily Doses (DDDs)
Oslo (Norway): WHO Collaborating Centre for Drug Statistics Methodology; 2009.
Capelli G. Descriptive tools and analysis. In: Elseviers MM, editor. Drug utilization studies. Methods and use.
Copenhagen (Denmark): WHO Regional Office for Europe; 1997. p. 65-74.
Acknowledgements
ABC Calc
Introduction
Instructions
Enter consumption data
Enter hospital data-Get results
Ready



Row	Name of product	Grams per unit dose	Nr. unit doses per package	Name of antibacterial	ATC code	Adm. route	DDD (WHO 2006)	U	Nr. DDD per package	Nr. packages	Nr. grams	Nr. DDD
3		1	1	Demeclocycline	J01AA01	O	0.6	g	1.7	1	1.0	1.7
5				Doxycyline (Oral)	J01AA02	O	0.1	g	0.0		0.0	0.0
7				Doxycyline (Parenteral)	J01AA02	P	0.1	g	0.0		0.0	0.0
9				Chlortetracycline	J01AA03	O	1	g	0.0		0.0	0.0
11				Lymecycline (Oral)	J01AA04	O	0.6	g	0.0		0.0	0.0
13				Lymecycline (Parenteral)	J01AA04	P	0.6	g	0.0		0.0	0.0
15				Metacycline	J01AA05	O	0.6	g	0.0		0.0	0.0
17				Oxytetracycline (Oral)	J01AA06	O	1	g	0.0		0.0	0.0
19				Oxytetracycline (Parenteral)	J01AA06	P	1	g	0.0		0.0	0.0
21				Tetracycline (Oral)	J01AA07	O	1	g	0.0		0.0	0.0
23				Tetracycline (Parenteral)	J01AA07	P	1	g	0.0		0.0	0.0
25				Minocycline (Oral)	J01AA08	O	0.2	g	0.0		0.0	0.0
27				Minocycline (Parenteral)	J01AA08	P	0.2	g	0.0		0.0	0.0
29				Rolitetracycline	J01AA09	P	0.35	g	0.0		0.0	0.0
31				Penimepicycline	J01AA10						0.0	
33				Clomocycline	J01AA11	O	1	g	0.0		0.0	0.0
35				Tetra. + chlortet. + demecio. (115.4:115.4:69.2)	J01AA20	O	0.6	g	0.0		0.0	0.0
37				Comb. of tetracyclines (other)	J01AA20							
39				Oxytetracycline, combinations	J01AA56							
41				Chloramphenicol (Oral)	J01BA01	O	3	g	0.0		0.0	0.0
43				Chloramphenicol (Parenteral)	J01BA01	P	3	g	0.0		0.0	0.0
45				Thiamphenicol (Oral)	J01BA02	O	1.5	g	0.0		0.0	0.0
47				Thiamphenicol (Parenteral)	J01BA02	P	1.5	g	0.0		0.0	0.0
49				Ampicillin (Oral)	J01CA01	O	2	g	0.0		0.0	0.0
51				Ampicillin (Parenteral)	J01CA01	P	2	g	0.0		0.0	0.0
53				Ampicillin (Rectal)	J01CA01	R	2	g	0.0		0.0	0.0
55				Pivampicillin	J01CA02	O	1.05	g	0.0		0.0	0.0
57				Amoxicillin (Oral)	J01CA04	O	1	g	0.0		0.0	0.0
59				Amoxicillin (Parenteral)	J01CA04	P	1	g	0.0		0.0	0.0
61				Bacampicillin	J01CA06	O	1.2	g	0.0		0.0	0.0
63				Epicillin (Oral)	J01CA07	O	2	g	0.0		0.0	0.0
65				Epicillin (Parenteral)	J01CA07	P	2	g	0.0		0.0	0.0
67				Pivmecillinam	J01CA08	O	0.6	g	0.0		0.0	0.0
69				Mecillinam	J01CA11	P	1.2	g	0.0		0.0	0.0
71				Metampicillin (Oral)	J01CA14	O	1.5	g	0.0		0.0	0.0
73				Metampicillin (Parenteral)	J01CA14	P	1.5	g	0.0		0.0	0.0
75				Talampicillin	J01CA15	O	2	g	0.0		0.0	0.0
77				Temocillin	J01CA17	P	2	g	0.0		0.0	0.0
79				Hetacillin	J01CA18	O	2	g	0.0		0.0	0.0


Microsoft Excel - Copy of ABC_Calc_3.1
Nr. beds
Occupancy index (during study period)
Nr. days (during study period)
OR
Nr. bed-days 0
Antibacterial use, by ATC level 2 to 4
Excl. colistin (in MU)
Excl. colistin
ATC level 2
ATC level 3
ATC level 4
ATC level 5
Nr. grams
Nr. DDD
Nr. grams per 100 bed-days
Nr. DDD per 100 bed-days
J01 Antibacterials for systemic use (Total)
J01A Tetracyclines
J01D Other beta-lactam antibacterials
J01E Sulfonamides and trimethoprim
J01F Macrolides, lincosamides and streptogramins
ABC Calc
Introduction
Instructions
Enter consumption data
Enter hospital data-Get results
Ready
start

Comparing DDD/1000 patient days



What is the current DDD for Vietnam?

And what would be acceptable?

Global Antibiotic Resistance Partnership

What data available in Vietnam?

- How much antibiotics:
  - Imported? Exported?
  - Produced in Vietnam?
  - Consumed by humans in hospital?
  - Consumed by humans in community?
  - Used in agriculture?

- Can we set up a system for Vietnam for
  - Hospital
  - Community
  - Agriculture

- Who has useable data: MoH?
- Create yearly reports

- From antibiotic consumption to antibiotic resistance surveillance

AB resistance surveillance

Source:
ReAct

Global Antibiotic Resistance Partnership

Pan-resistance already arrived

Increasing reports of pan-resistant untreatable gram negative infections

-Resistant to cephalosporins, carbapenems, quinolones, aminoglycosides

Last resort drug is colistin (NOT AVAILABLE IN VIETNAM)

Now also strains colistin resistant

Source: Falagas ME, Kasiakou SK. Clin Infect Dis 2005
Michalopoulos AS, et al. Clin Microbiol Infect 2004

Resistance surveillance

- Should be simple, feasible
- Only good quality data allowed
- Cover hospital, community, food production
- Standardized data collection to make comparisons possible
- Timely collection and reporting

Global Antibiotic Resistance Partnership

Resistance testing Vietnam

- Quality control not always in place
- No interpretative reading (=checking impossible resistance phenotypes)
- No central reporting

- Can we set up a surveillance in Vietnam?

Problems with resistance testing

- Quality problem examples (see session 3,11: 20am, Dr Phuong)
  - Pseudomonas being tested for vancomycin, which does not work for this bacterium
  - P. aeruginosa commonly found cotrimoxazol sensitive, while it is generally resistant.
  - S. aureus: meticillin resistant and cefuroxim susceptible. If MRSA than all beta-lactams are ‘R’.
  - Often S.aureus vancomycin resistant. This requires confirmation.
  - No confirmation of impossible or unlikely resistances
  - No proper quality assurance or proficiency testing

Improve quality

- Good national procedure according to CLSI
- Make a Vietnamese translation of CLSI protocols
- Only allow hospitals in surveillance with good results from proficiency testing
- Time for a National Society of Medical Microbiology (see presentation Day 2, Dr Ton van der Velden)

Global Antibiotic Resistance Partnership

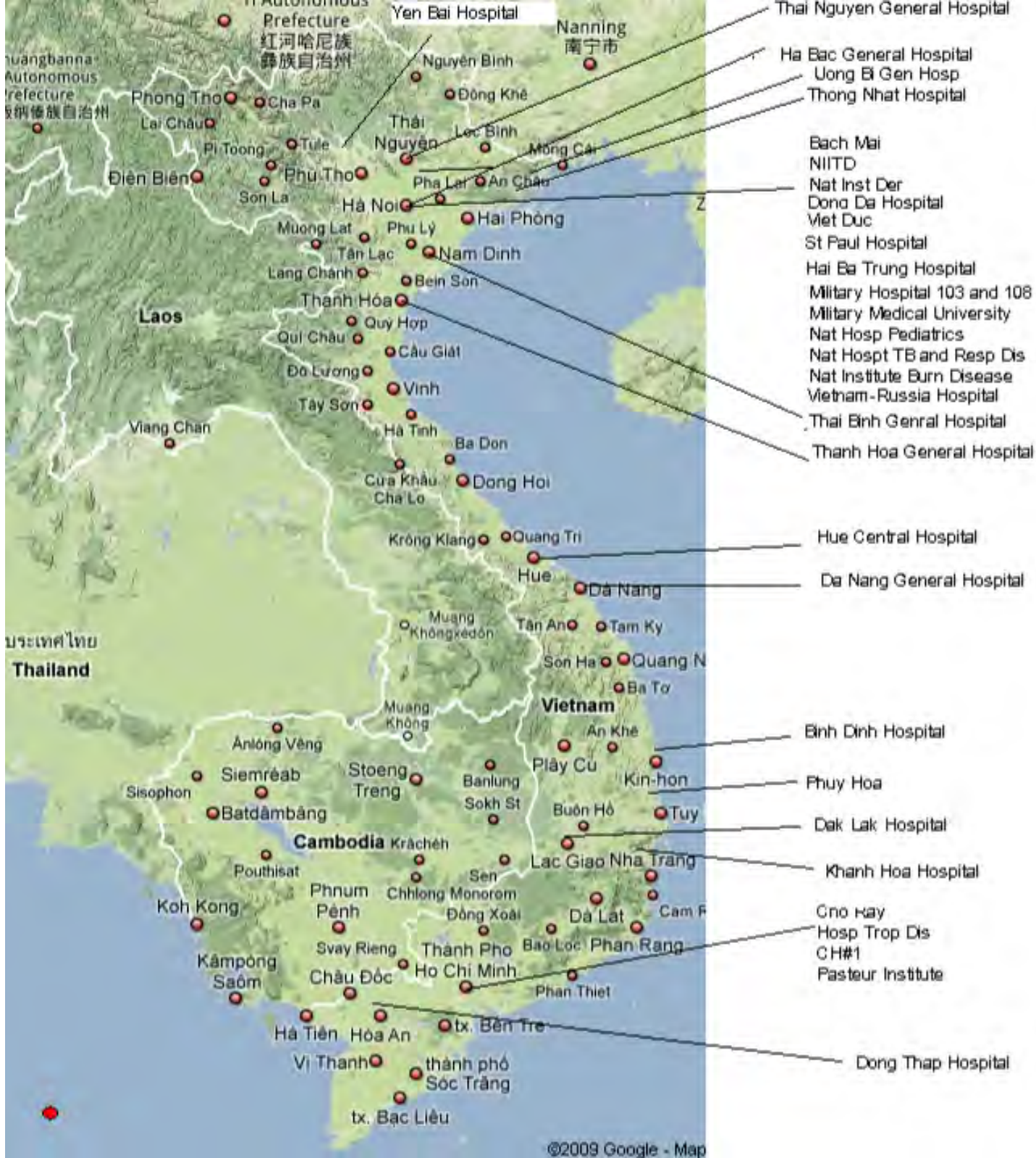
ASTS database

- All data of ASTS now entered in central database by Oxford-Hanoi

- Data analysis expected by October 2009

ASTS experience

- See Session 3, 11am, Prof.Ca presentation
- Should we set up a new surveillance?
- If yes, can we do surveillance at low costs?
  - Start with a central database system for hospitals with good testing capacity and spread in Vietnam (North – Middle – South)
  - External quality assurance (proficiency testing)
  - Expand to other populations once surveillance system functions (out-patient, community, etc)


Yen Bai Hospital
Thai Nguyen General Hospital
Ha Bac General Hospital
Uong Bi Gen Hosp
Thong Nhat Hospital
Bach Mai
NIITD
Nat Inst Der
Dong Da Hospital
Viet Duc
St Paul Hospital
Hai Ba Trung Hospital
Military Hospital 103 and 108
Military Medical University
Nat Hosp Pediatrics
Nat Hospt TB and Resp Dis
Nat Institute Burn Disease
Vietnam-Russia Hospital
Thai Binh Genral Hospital
Thanh Hoa General Hospital
Hue Central Hospital
Da Nang General Hospital
Binh Dinh Hospital
Phuy Hoa
Dak Lak Hospital
Khanh Hoa Hospital
Cho Ray
Hosp Trop Dis
CH#1
Pasteur Institute
Dong Thap Hospital
Laos
Thailand
Vietnam
Cambodia
Nanning
南宁市
Prefecture
红河哈尼族
彝族自治州
Nguyên Binh
Đông Khê
Phong Tho
Cha Pa
Lai Châu
Thái
Nguyên
Lộc Bình
Pi Toong
Tuần
Móng Cái
Điện Biên
Phu Tho
Pha Lai
An Châu
Son La
Hà Noi
Hai Phòng
Mường Lat
Phu Lý
Tân Lạc
Nam Dinh
Lang Chánh
Bein Sơn
Thanh Hóa
Quy Hợp
Qui Châu
Câu Giát
Đo Lương
Vinh
Tây Sơn
Viang Chan
Hà Tinh
Ba Don
Cửa Khẩu
Cha Lo
Dong Hoi
Krông Klang
Quang Tri
Hue
Đà Nang
Muang
Không xédôn
Tân An
Tam Ky
Sơn Ha
Quang N
Ba Tơ
Muang
Không
Ânlóng Vèng
An Khê
Play Cu
Kin-hon
Siemréab
Stoeng
Treng
Banlung
Sisophon
Sokh St
Buôn Hồ
Tuy
Batdâmbâng
Krâchéh
Pouthisat
Lac Giao
Nha Trang
Sen
Phnum
Pénh
Chhlong
Monorom
Koh Kong
Đông Xoài
Da Lat
Cam R
Svay Rieng
Thành Phố
Bao Loc
Phan Rang
Kâmpông
Saôm
Ho Chi Minh
Châu Đốc
Phan Thiet
Hà Tiên
Hòa An
tx. Bến Tre
Vị Thanh
thành phố
Sóc Trăng
tx. Bạc Liêu
©2009 Google - Map

It is all about getting antibiotic use down! But complex

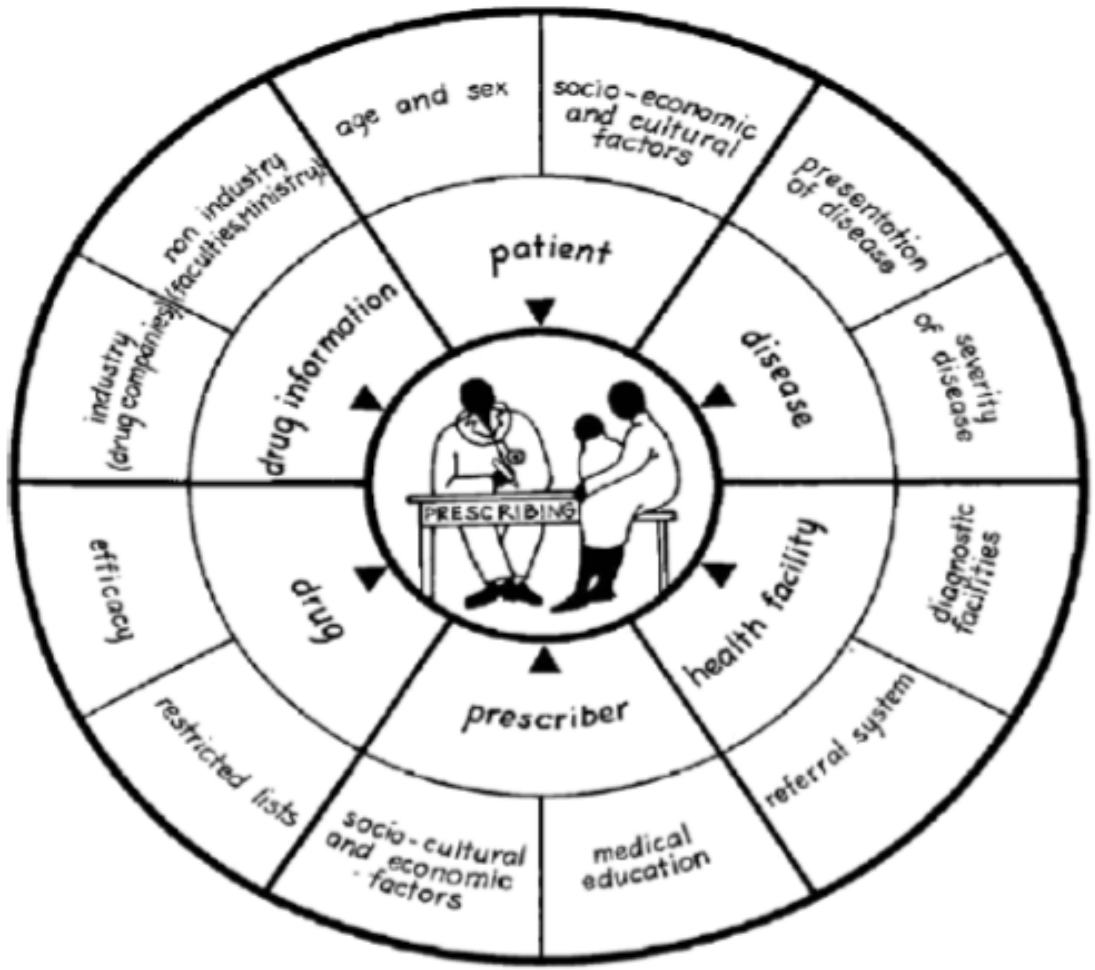


Fig. 3. The complexity of factors influencing prescribing. Source: Tomson, 1990.

Global Antibiotic Resistance Partnership

Success formula for controlling resistance:

$$\text{Performance} = \frac{\text{Incentives x knowledge}}{\text{barriers}}$$

adapted Muir Grey:2001

It is balancing of personal benefit and risk to community

Global Antibiotic Resistance Partnership