Infection control:
Need for robust guidelines

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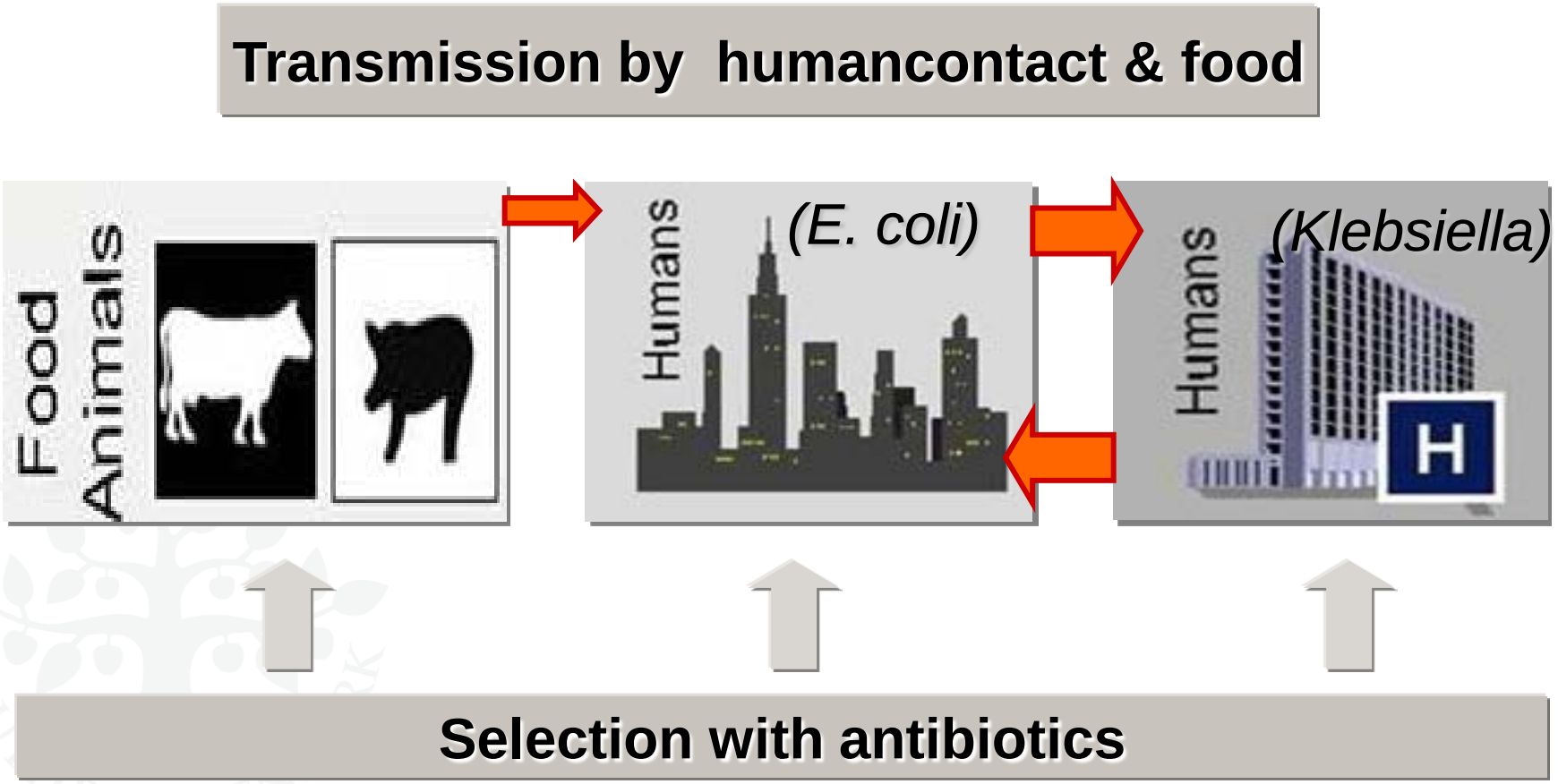
Combating carbapenemase and ESBL-producing Gram-negative bacteria
DTU 160312

Setting the scene

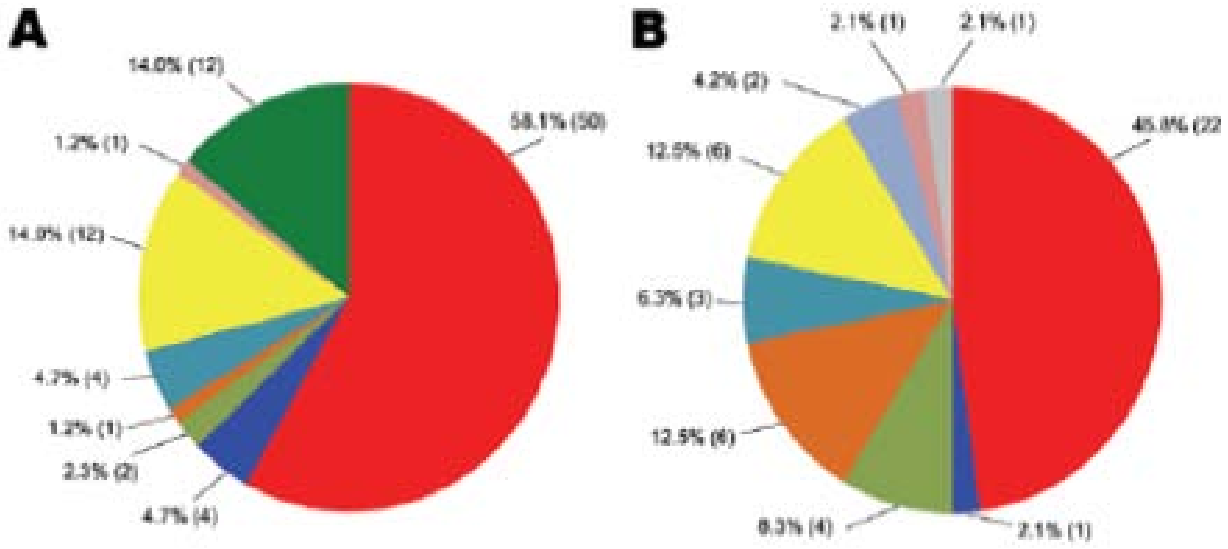
- **What is the problem?**
  - Underlying factors?
  - Routes of transmission?
  - Prevalence of the problem?
- **How to deal with the problem?**
  - Prevention?
  - Control?

Selection and transmission of resistance



We are what we eat:

ESBL genes in enterobacteria from chicken meat and humans in the same geographic ares

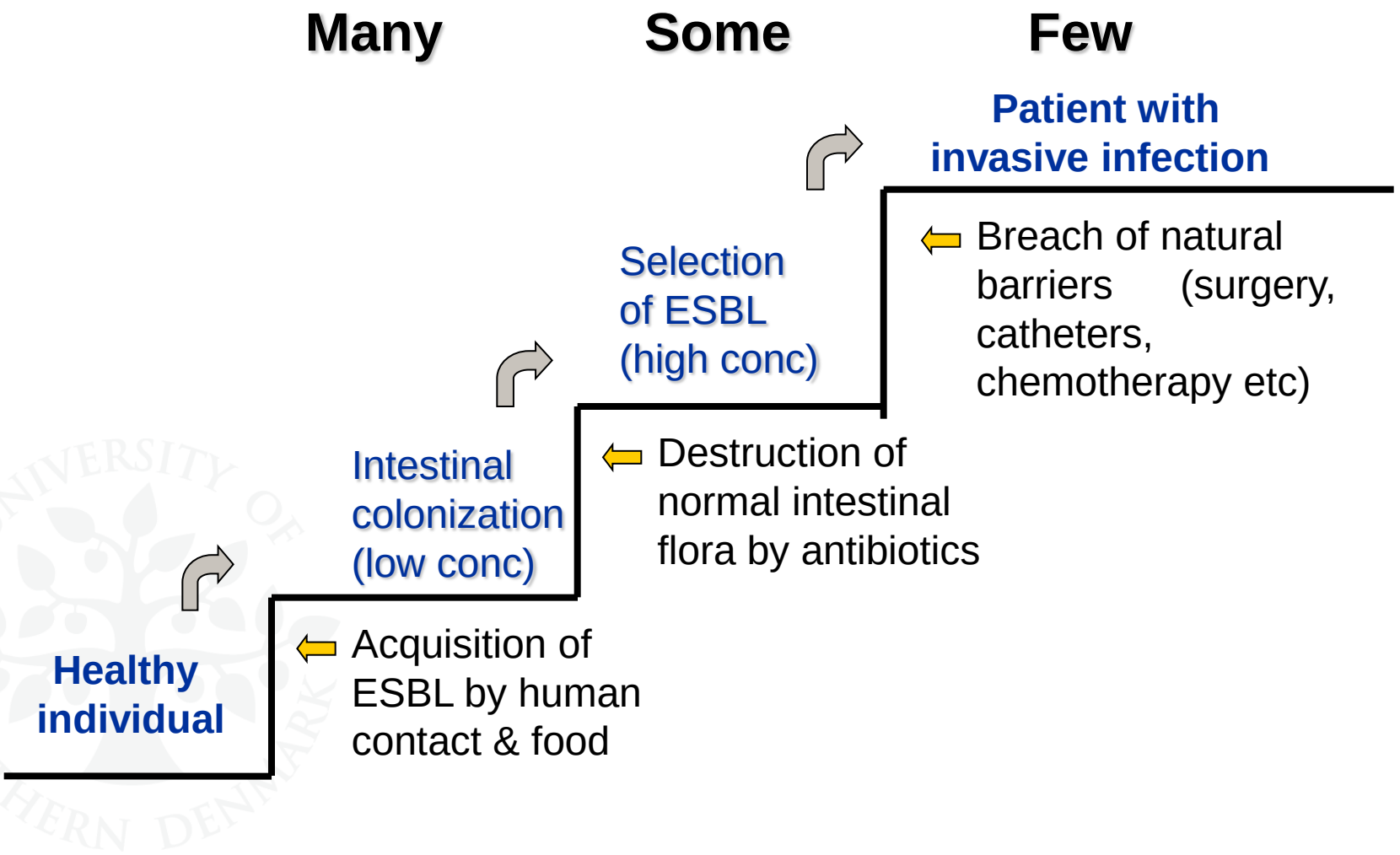


Chicken meat
80%

Human rectal swabs
5%

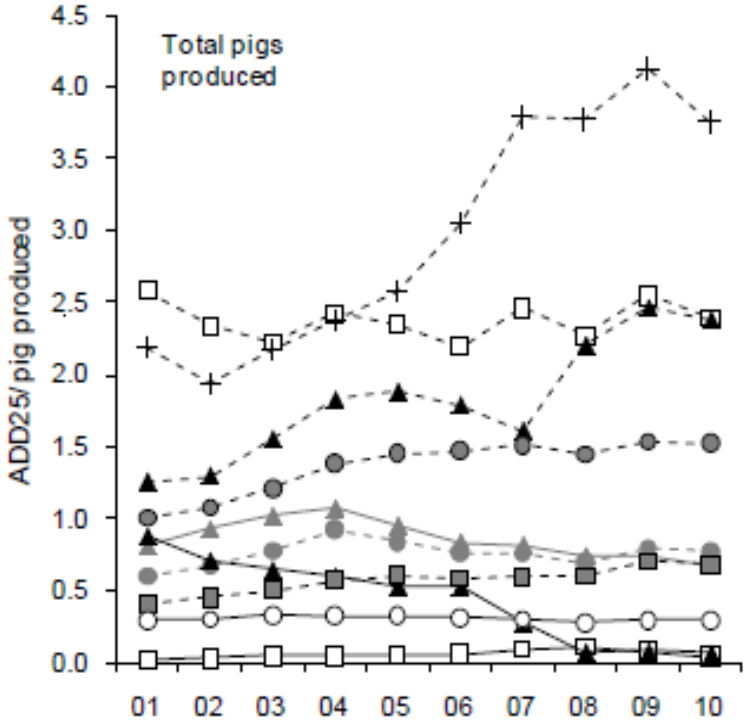
Overdevest et al. Emerg Infect Dis 2011;17:1216-22

ESBL: The steps from contamination to infection



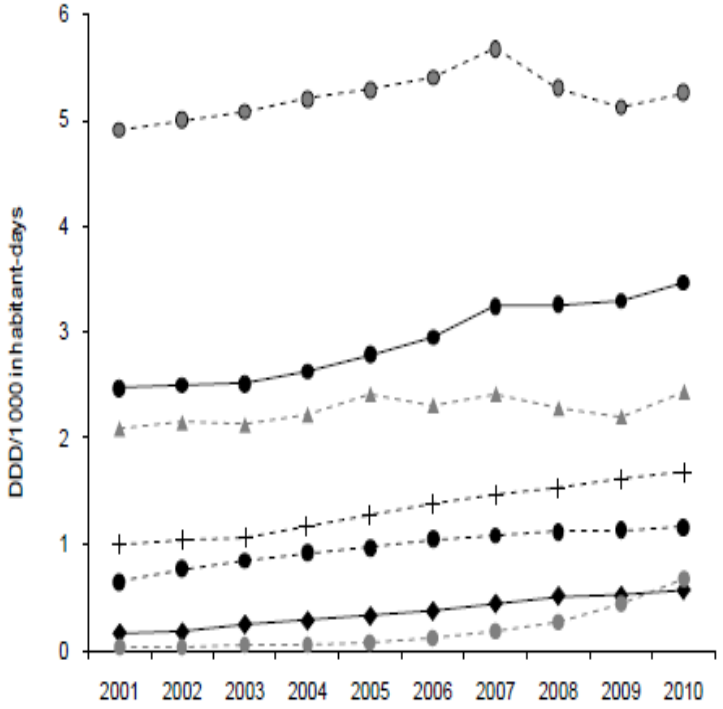
Consumption of tetracyclines in pigs and humans

Pigs



DANMAP 2010

Pts prim health care

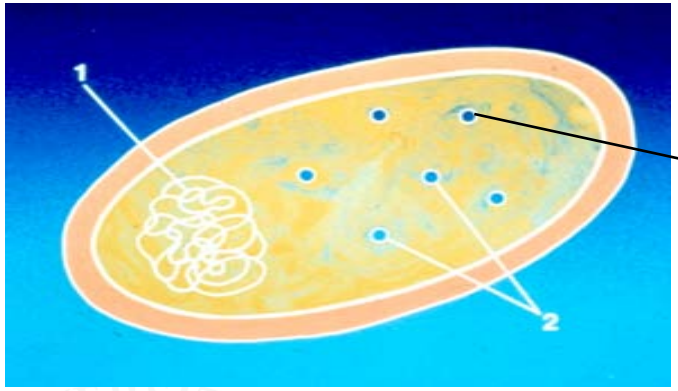


Tetracycline-resistance in ESBL-*E. coli* & MRSA from farm animals

ESBL *E. coli* (broilers & pigs)	**89-97 %**
MRSA CC398 (pigs)	**95 %**

Costa et al. Vet Microbiol 2009; 138: 339-44
Ho et al. JAC 2011; 66: 765-8
DANMAP 2008

Coupling of resistance characters on plasmids: the genetic background for co-selektion



R_{kobber}

R_{zink}

R_{tetra}

R_{ampi}

R_{ceph}

R_{genta}

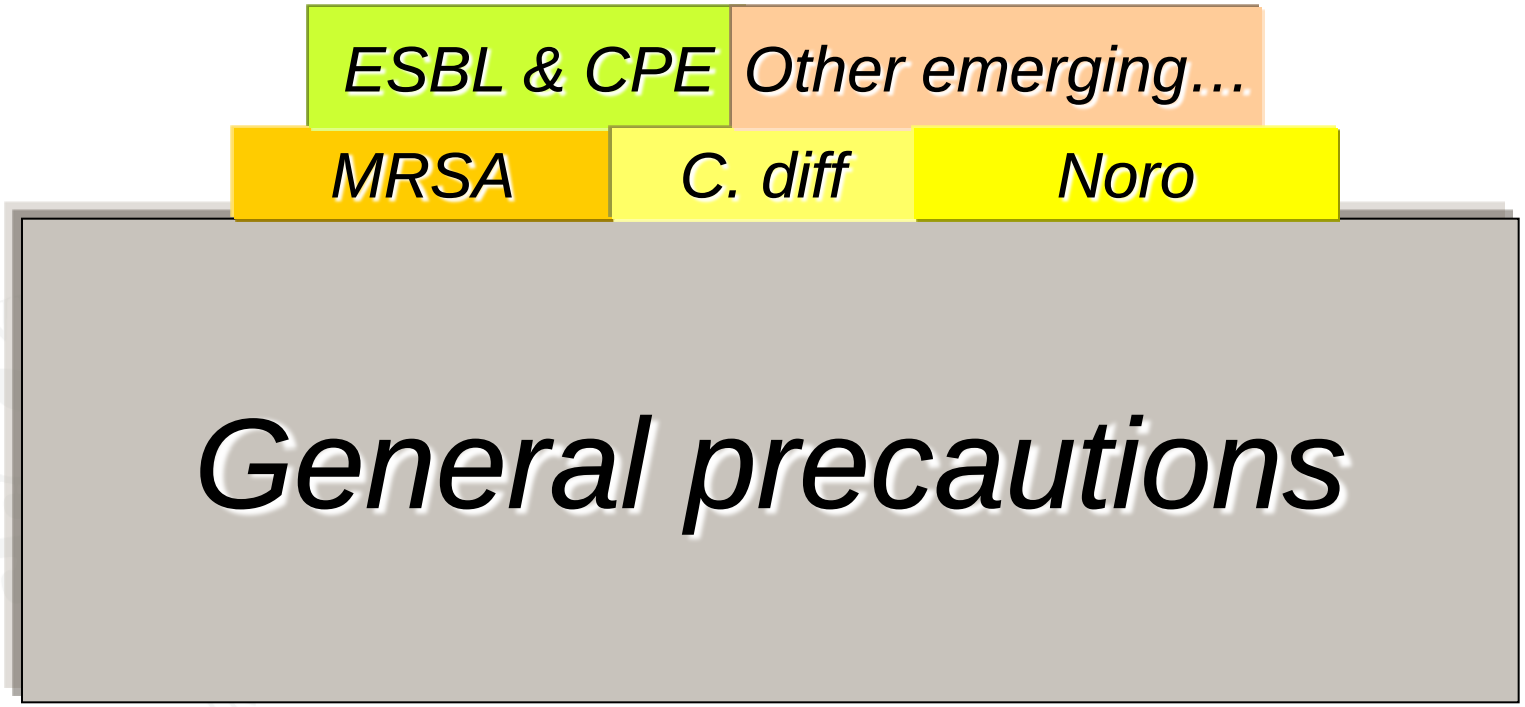
High-priority actions in reducing antibiotic prescribing

Tetracyclines
(Fluoroquinolones)
(Cephalosporins)

Fluoroquinolones
Tetracyclines

Fluoroquinolones
Cephalosporins

Infection control:
The foundation is general precautions



General precautions

- **Hand hygiene**
- **Targeted use of gloves & aprons**
- **Face protection, if relevant**
- **Spot disinfection of spills**
- **Disinfection/sterilization of utensils & equipment**
- **Proper domestic cleaning**
- **Safe reprocessing of laundry**
- **Safe handling of human secretions & waste**

….boring, but essential

Specific precautions:
"search, contain, and destroy"

- **Screening for ESBL & CPE**
- **Isolation of patients tested positive**
- **Eradication of ESBL & CPE carriage**
- **Follow-up & control**

….fancy, but probably not feasible

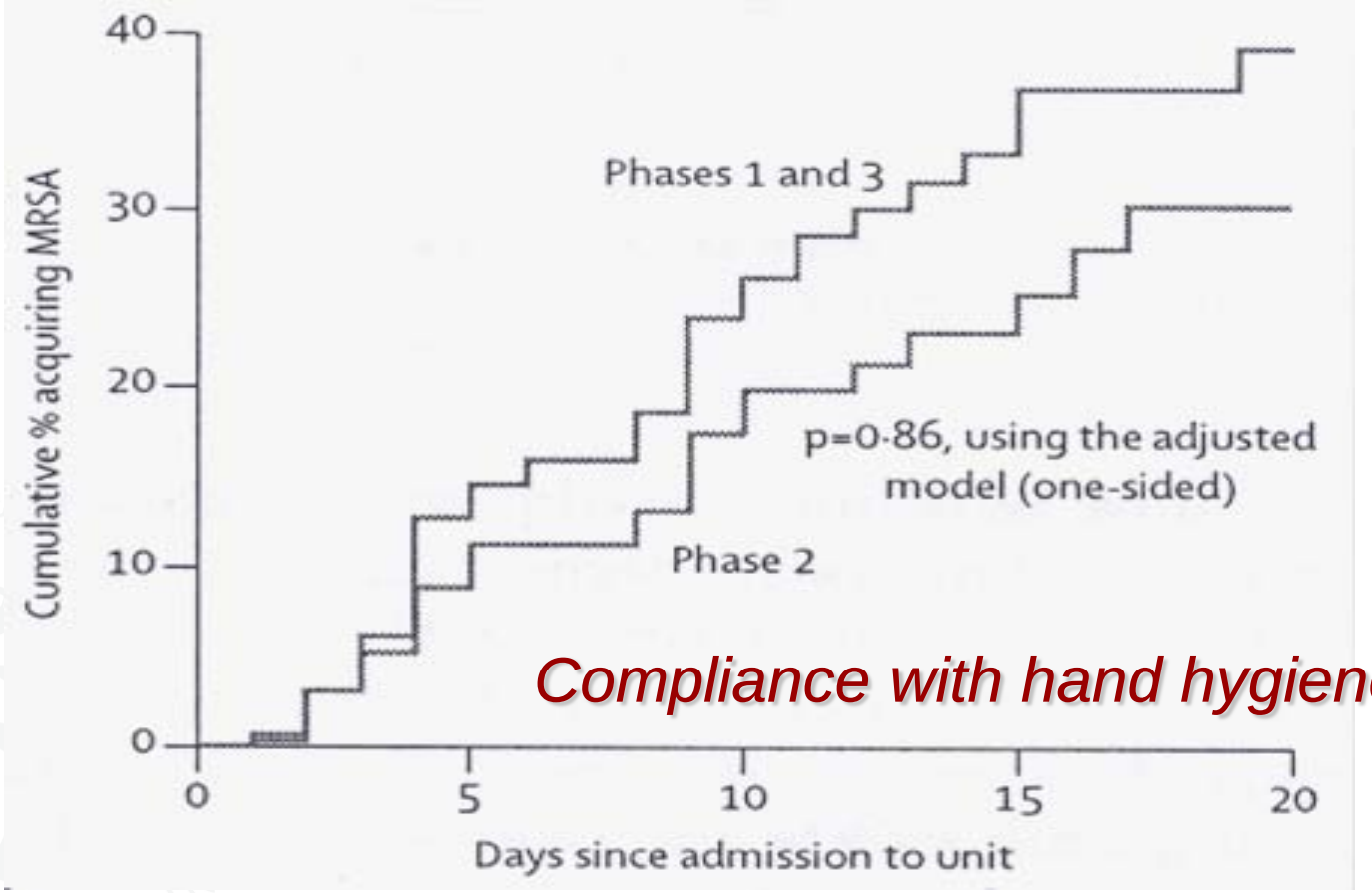
Screening for ESBL on admission?

	MRSA	ESBL
Expected strain prevalence	1-2 %	5-10 %
Well-defined risk groups	Yes	?
Eradication possible	Yes	?

Candidates for single-room isolation

	General precautions	Single-room isolation
ESBL only	**yes**	**no**
E. coli ESBL + cip- & genta-R	**yes**	**no**
Klebsiella ESBL + cip- & genta-R	**yes**	**yes**
CPE (VIM,NDM-1, KPC-2,oxa-48 etc.)	**yes**	**yes**

No effect of single room isolation on MRSA



Compliance with hand hygiene: 21 %

Cepeda et al Lancet 2005; 365: 295-304

Compliance decreased with the complexity of isolation regimes

	Contact precautions	Contact-droplet precautions	P
Overall compliance	50 %	40 %	0.05
Frequency of hand washing	63 %	46 %	0.0007

Evans et al. Surgery 2003; 134: 180-8

Single room isolation:
lower contact time with staff – more adverse events

Adverse events No/1000 days	Isolated	Controls	P
Preventable	20	3	<0.001
Non-preventable	11	12	0.98

Stelfox et al. JAMA 2003;290:1899-905

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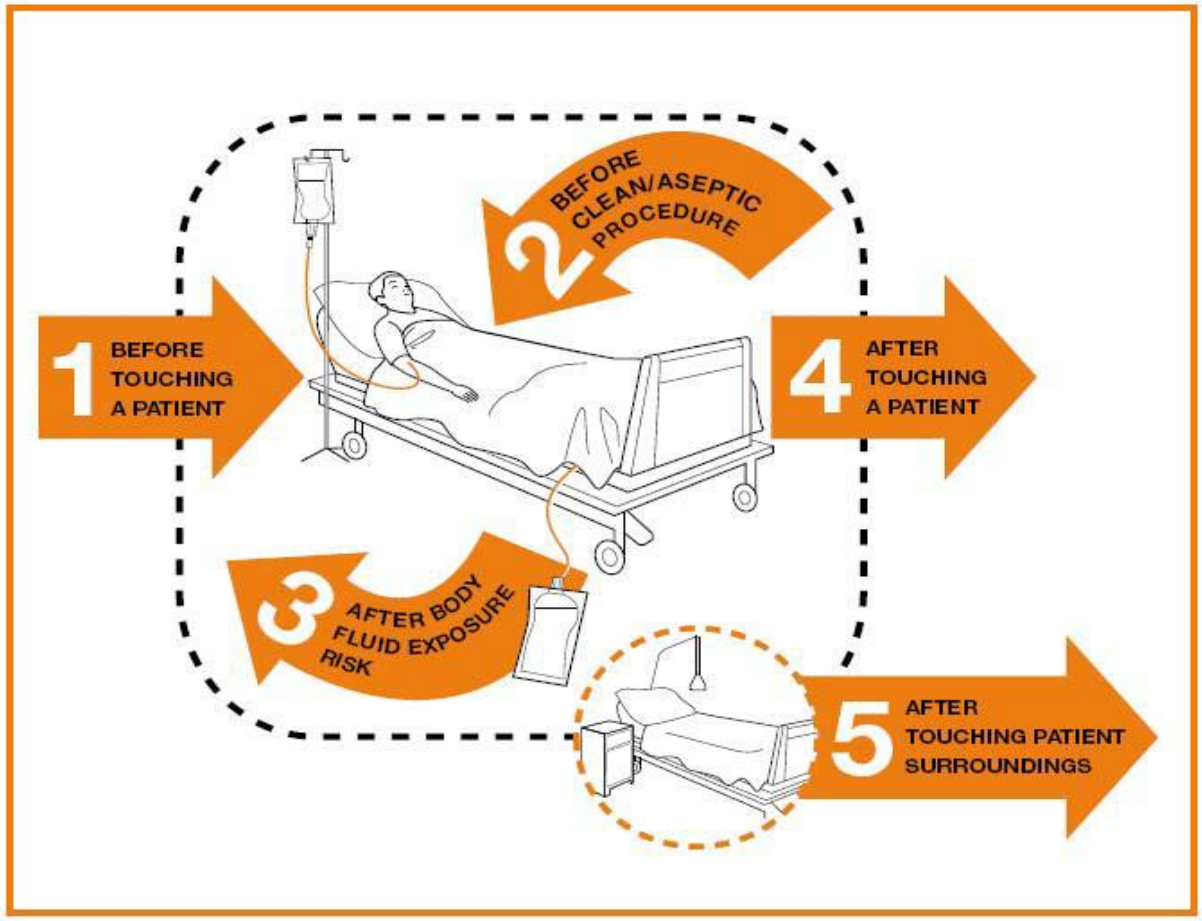
"our practice of contact isolation may indeed work not through preventing contact transmission, but by preventing contact with the isolated patient alltogether"

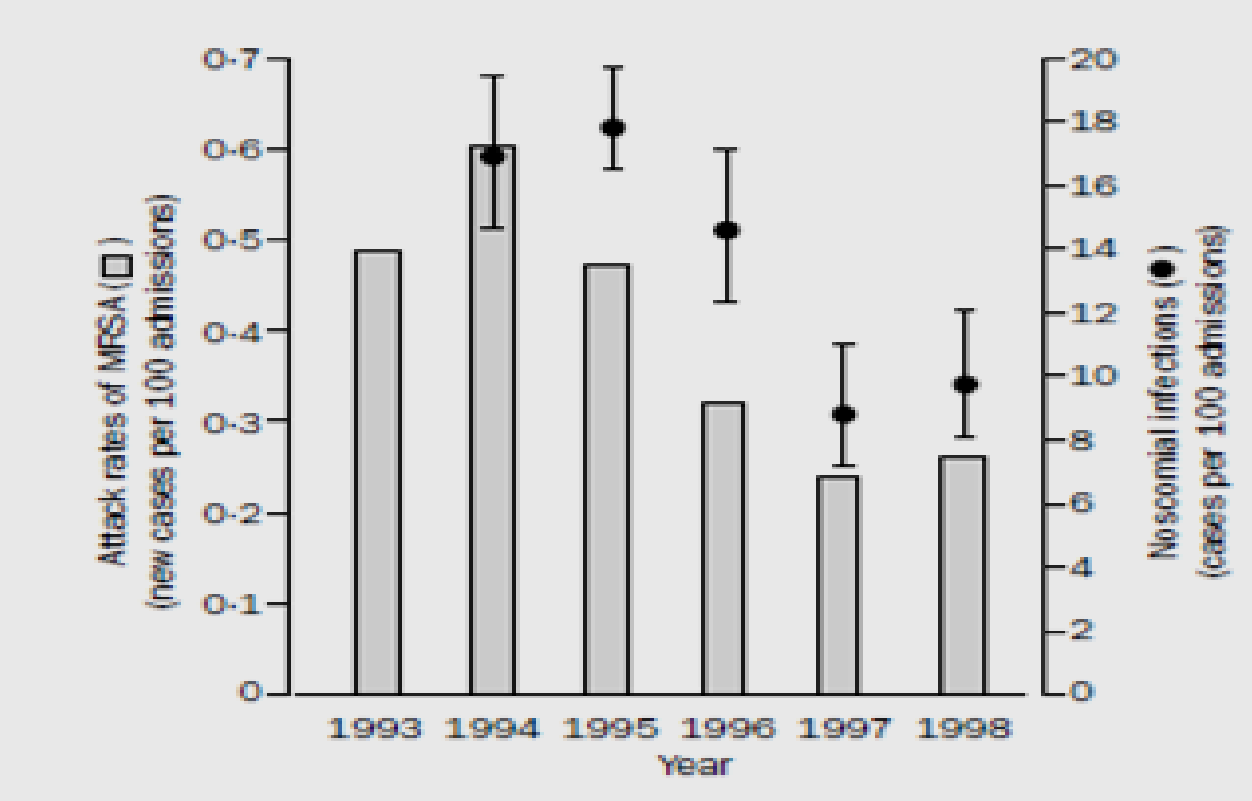
Evans et al. Surgery 2003; 134: 180-8

The five moments for hand hygiene:
Do the clinicians really understand?



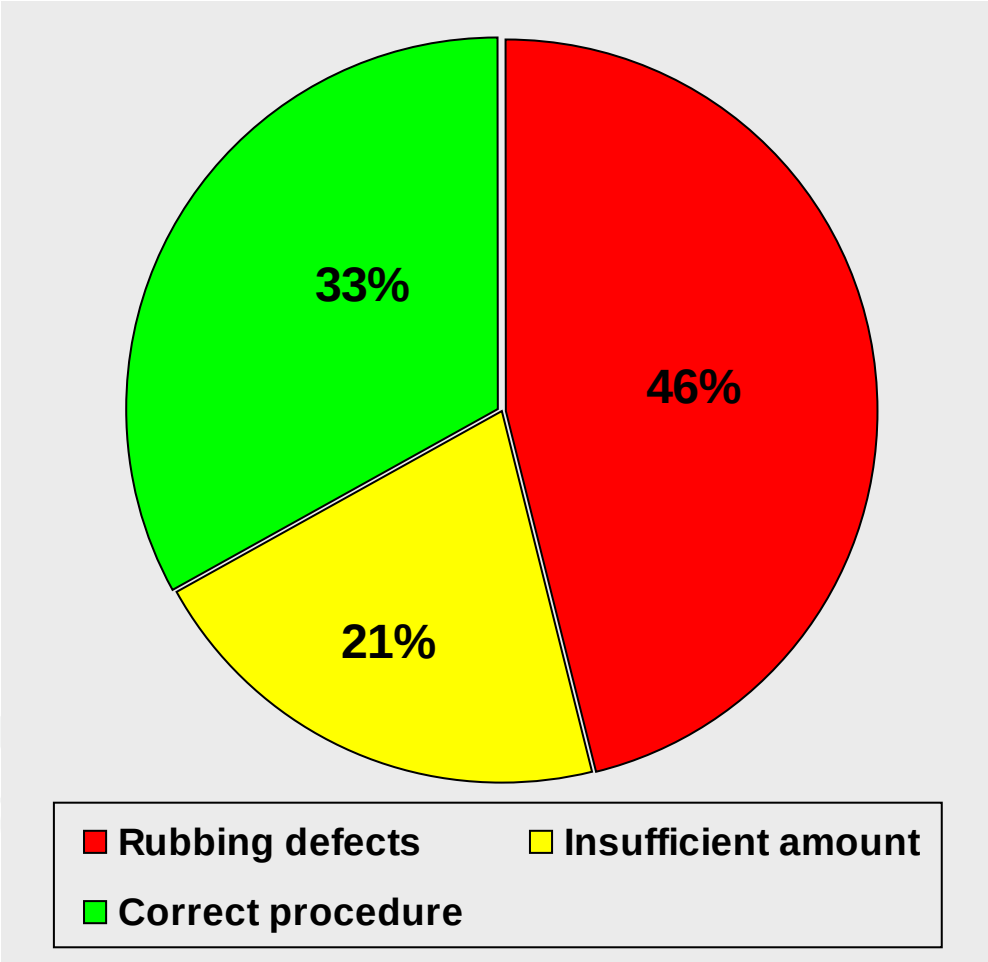
Courtesy: WHO

Effectiveness of hand hygiene (antiseptic hand rubs)



Pittet et al. Lancet 2000; 356: 1307-12

Antiseptic hand rub:
Progress – but with room for improvement



Conclusions

Important measures to control ESBL (& CPE):

- **Reducing selection by antibiotic restriction**
  - Health care
  - Food production
- **Hygienic measures against transmission by contact**
  - Focus on general precautions
  - Particularly hand hygiene & safe handling of food
  - Single room isolation in selected cases
- **Key principle*: Keep it simple !***