Strategies to Control Preventable Infections in Long Term Care Facilities

Prof. Bjørg Marit Andersen, Oslo University Hospital, Norway

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Strategies to control preventable infections in long-term care facilities

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Hosted by Paul Webber
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Nosocomial* infection in Long-Term Care is

- A major source of morbidity and mortality Spaulding Nursing Homes 2006
- Accounts for 30% of hospital admissions from nursing homes in USA Irvine et al Am Ger Soc 1984;32:103
- Is the most common immediate cause of death in nursing homes Rudman et al. J Am Ger Soc 1987;35:496
- Significantly associated with higher categories of dependency

* "Nosocomial= "house- common" – living together, for instance in healthcare institutions. Nosocomial infection = Healthcare- associated infection (HAI)

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Prevalence of infections in nursing homes in different countries

Prevalence of infections: 5 - 33%

Table 1. Prevalence studies in some LTCF /nursing homes

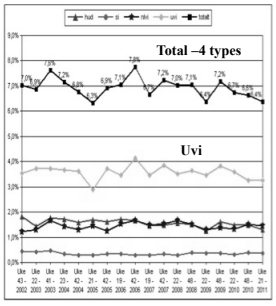
Country	Year	Number studied	Categories of infections	Prevalence point	References
Italy	2006	1 926	All types	8,4 %	Moro et al. 2007
USA					
Nursing home	1981	532	All types	16.2%	Garibaldi et al. 1981
VA nursing homes	2005	11 475	All types	5.2 %	Tsan et al. 2009
VA nursing homes	2007	10 939	All types	5.3 %	Tsan et al. 2009
Norway					
Oslo County	1997-1999	13 762	All types	6.5 %	Andersen, Rasch 2000
Oslo County	2000	3 474	All types	5.6 %	Andersen, Rasch 2002
Oslo County	2001	4 650	All types	7.5 %	Andersen, Rasch 2002
Bærum County	2001	262	All types	8.4 %	Bucher et al 2001
Country	2002		4 types*	6.6%	Eriksen et al 2004
Country	2003		4 types*	7.3%	Eriksen et al 2004
Country	2009 spring	13 795	4 types*	6.4 %	NHI 2009
Country	2009 autumn	16 743	4 types*	7.2 %	NHI 2009
Country	2011 spring	19 271	4 types*	6.4 %	NHI 2011
Germany	2006-2007	2 369	All types	6.8%	Engelhart et al. 2009
France	2006-2007	44 870	All types	11.2%	Chami et al 2010
Hong Kong	2008	1 603	All types	5.7%	Chen et al. 2008

*) urinary tract infection, lower respiratory tract infection, postoperative wound infection and skin infection
NHI = National Health Institute of Norway

The burden of nosocomial infections is high

- also in Norwegian nursing homes

- **More than 7% have infections**
- **1% higher than in hospitals!**
- **0.8% of the Norwegian population live in nursing homes with**
  - Complex medical problems
  - 77% > 80 years old and median age 84 years
  - 95% needs assistance for daily living



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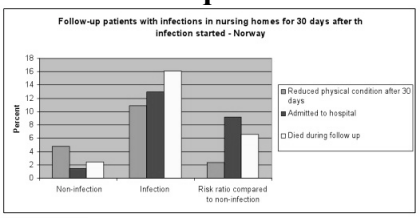
- and infections may have severe consequences-



- **A follow-up study in Norway during 30 days after the infection started, demonstrated that infections may have severe consequences**
- **-"including debilitation, hospital admission and death."**
- Koch et al. JHI 2009; 71:269-274, Norway

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The global elderly population is increasing

- **It is estimated that in 2050**
  - **20% of the global population is > 65 years old**
  - **2.5 billion people** (>65 years) (Strausbaugh Emerg Inf Dis 2001;7)
- **European population > 80 years**
  - **20 mill in 2006**
  - **57 mill in 2050**
- **USA population > 65 years**
  - **20% of the population in 2030 –and it is estimated that 30 mill more than today may need LTCare** **(US Census)**

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The population development is shown in "pyramides" 1956, 2006 and 2050- for Germany

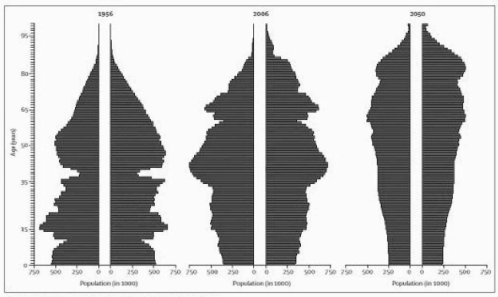


Figure 2: Population pyramids for Germany in 1956, 2006, and 2050
Horizontal bars are proportional to number of men (blue) and women (red). Data for 2050 are based on the German Federal Statistical Office's 1-W1 scenario, which assumes a roughly constant total fertility rate of 1·4, yearly net migration of 100 000 and life expectancy in 2050 reaching 83·5 years for men and 88·0 years for women. Data from reference 32 and the Human Mortality Database.

Estimated consequences of the "elderly boom"

- **There will be more and older patients in long-term care**
- **More patients with chronic diseases - may live longer**
- **There may be more infections, often caused by more resistant strains ("global microbiology")**
- **Surgical treatment on older persons may increase (heart and orthopedic surgery etc) and thereby more postoperative infections** (US Census)
- **This may challenge economy, facilities and care givers**
- **Ongoing financial crisis and a lower national resource/ income – may have a severe impact on this future for older people**
- (Christensen el al. Lancet 2008; 374:1196-1208, London School of Economics. EU study series. 2003)

PATTERNS OF INFECTIONS

IN LONG-TERM CARE FACILITIES
II

Infections in long term care are -

Ordinary healthcare-associated infections like

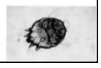
- Urinary tract infection *with symptoms* 3-4++%
- Lower respiratory tract infections: 1.5-2%
- Infections in skin and wounds (pressure/diabetes wounds):1.5-2%
- Postoperative wound infections: 1% (-20% of operated)
- Eye and nail infections, and other infections: 0.5-2%

- *Staphylococcus aureus* and Gram negative rods predominates; more or less resistant to antibiotics

In addition,

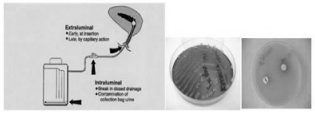
Seasonal or endemic/local outbreaks are also common

- Gastrointestinal infections (*Clostridium difficile*, Noro-, rota-, adenovirus etc)
- Influenza virus, *Mycoplasma*, *Chlamydia pneumoniae, pneumococci etc*
- Resistant bacteria – endemic- epidemic (MRSA, VRE, ESBL, etc)
- Scabies and other small animals may also create some problems!



Urinary tract infection is the main problem in nursing homes (3-4++%)

- **40% of all LT care infections; both gender – associated with**
  - **Urinary incontinence (stress/urge/mixed/overflow/functional)**
  - **Immobilization**
  - **Dehydration**
  - **Dementia**
  - **Often asymptomatic**
  - **Indwelling catheter**
  - **Catheter use during diarrhoea- 9 x risk for UTI**
  - **Cross contamination via hands, catheter use, textiles etc.**



- **This is the "antibiotic-consuming illness" which often results in development of very resistant bacteria**

- **Dowling-Castronovo A et al. 2008 in:Capezuti et al (ed) Evidence-based geriatric nursing protocols-Springer Publ Comp;2008, Grabe et al. European Ass of Urology (EAU); 2009 Mar. p65. Kamel HK. Ann Long-term Care 2005;13, CDC**

Lower respiratory tract infection – is the main cause of mortality

- It may often show a marked seasonal pattern
- Associated with dysphagia and aspiration among elderly
- Infectious agents are transmitted by contaminated swabs, hands, air, food/water etc.
- Transmitted from other sick persons like staff, other patients, visitors
- Resulting in
  - Pneumonia
  - Bronchitis
  - Influenza-epidemics, followed by bacterial invasion of
    - Pneumococci
    - Staphylococcus aureus
- In 50% of the cases, the antibiotic use is inappropriate

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Invasive pneumococcal disease – pre-conjugate vaccine era. Seasonality and age groups

Trotter et al JHI 2010;60:200-208

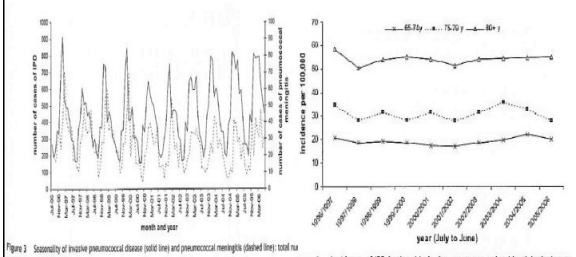


Figure 2 Incidence of IPD in the elderly, by age group and epidemiological year.

Pandemic influenza 2009 was no problem for elderly in Norway or elsewhere,

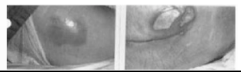
but *ordinary* influenza is!

There are still many questions like-

- Who should be protected against influenza?
- Who should be vaccinated – every year?
- Who should use PPE?
- What kind of PPE?

Decubitus ulcer, bedsore

- **From pressure --> to ulcer may take 4-5 days, - or a few hrs in high risk patients**
- **Pressure sores in nursing homes in USA** (National Nursing survey 2004):
  - 11% (159 000)
  - 60 000 die/year from complications - mostly infections
  - **-"a life-threatening nursing home injury"**
- **Prevalence in Norwegian nursing homes: 4-9%**
- **Prevalence of infected bedsores: 1 -2%**
- Andersen, Rasch, JHI 2000; 46:288-296, Andersen,Rasch Tidsskr Nor legeforen 2002;122:2371-2373
- **This is one important indicator of quality of care in all nursing homes !**

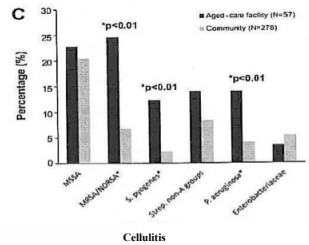


Postoperative *chronic* wound infections after unsuccessful surgery - often ends in nursing homes-

- **Ca 1% of patients in nursing homes have postoperative wound infection**
- ***Staphylococcus aureus*- is the predominant bacteria**

Other skin infections

Erysipelas, cellulitis and other skin infections, often i diabetic patients



Cellulitis

Figtree et al J Infect 2010;60:431-439

Clostridium difficile infections (CDI) increases in Long term care

- **Elderly are at a special risk** (Bartlett et al. *N Engl J Med* 2005;353:2503-2505)
- **Up to 40% of gastroenteritis cases have CD** (Pa Patient Saf Advis 2010;18:10-5)
- **Antibiotics with a special CD-risk are: Clindamycin, 3th gen. Cephalosporins, Fluoroquinolones**
- **CD increases in incidence and severity in North America and Europe- with the development of toxin-producing, hyper - virulent strains; BI/NAP1/027 ao.** (Mulvey et al Emerg Inf Dis 2010;16.)
- **There is a transmission risk from asymptomatic carriage –from skin and hands - and tube feedings**
- **CD may be airborne** (Best et al.Clin Infect Dis 2010; 50: 1450-1457, Donskey)
- **The economic healthcare cost - is incremental in hospitals – the cost in nursing homes is unknown**
- 5,000-8,000 USD per primary case and 13,500 USD per recurrent case in hospitals (Ghantoji et al. JHI 2010;74:309)

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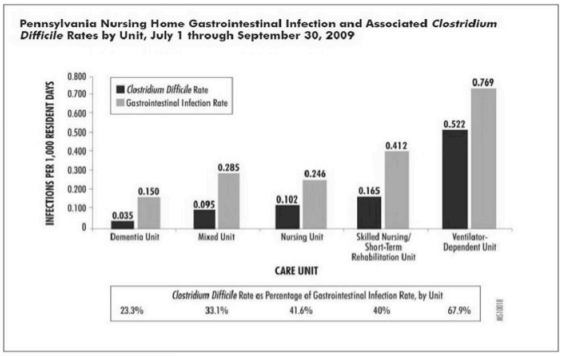
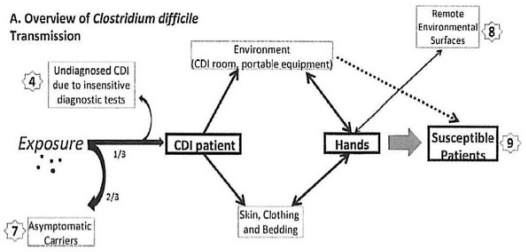
Clostridium difficile Infections in Pennsylvania Nursing Homes

Pa Patient Saf Advis 2010 Mar 18;7(Suppl 1):10-5.



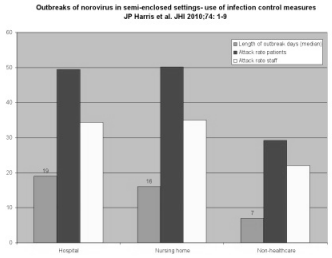
Clostridium difficile is transmitted -by shedding long-living spores



Donskey CJ. CID 2010; 50:1458-1461

Norovirus – attacks patients and staff in nursing homes in epidemic outbreaks

- Length of outbreak: 14-20 days
- Attack rate in <u>patients</u>: 46-52%
- Attack rate in <u>staff:</u> 35-37%



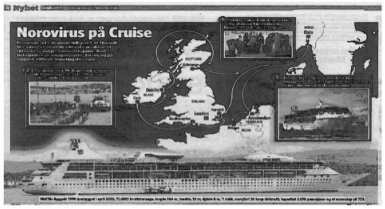
Often repeated infections and outbreaks. A robust and resistant virus!

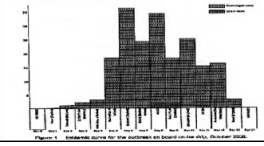
Excretion –may be up to 32 days in elderly

- Aoki et al JHI 2010 75: 42-46

"Norovirus on Cruise" in Europe -May 2010

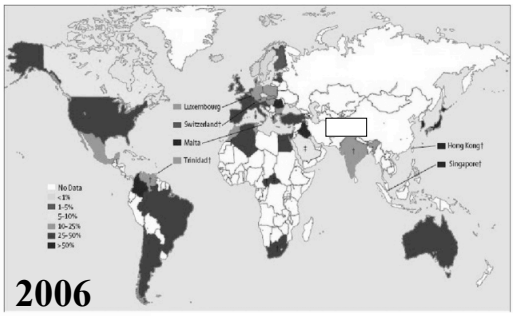
May be imported to healthcare from elderly after "virus-cruise"





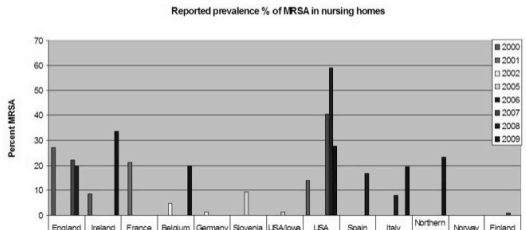
Vivancos et al J Infect 2010;60:478

MRSA –is a global public health threat



Grundmann H et al. Emergence and resurgence of meticillin-resistant Staphylococcus aureus as a public-health threat. Lancet. 2006 Sep 2;368(9538):874-85

Reservoirs of MRSA in nursing homes may increase



	England	Ireland	France	Belgium	Germany	Slovenia	USA/Iowa	USA	Spain	Italy	Northern Ireland	Norway	Finland
2000	27	8.6						14					
2001			21										
2002				4.9	1,1								
2005						9.3	1.3						
2006					0					7.8			
2007	22							40.4					0.9
2008	20							59	16.8				
2009		33.6		19.9				27.5		19.3	23.3	0.1	

Both patients and staff are affected ----

- **Some studies from**
  - Italy 2009: 19,3%, and 5,8% in staff
  - Northern Ireland 2009: 23,3%, and 7,5% in staff
  - Norway 2009: 0,2%, and <0,1% in staff
- **The index person may often be a staff** Albrich og Harbarth Lancet Inf Dis 2008;8: 289-301
- **Special problems are:** decubitus ulcers, catheters and skin infections – and multiple - site colonization
- **The epidemiological impact** of MRSA – is related to hospital admissions and severe infections
- Manzur &Guidol Clin Microbiol Infect 2009; 15 (suppl 7): 26-30, Bradly S, Ann Intern Med 1991;115:417-422, Monaco et al, JHI 2009, O'Sullivan &Keane JHI 2000; 45: 322-329, Furuno et a. AJIC 2008; 36: 468-471, Baldwin et al. J Am Ger Soc 2009; 57:620-626, Barr et al.ICHE 2007;28: 853-9, Stone et al.ICHE 2008;29: 143-8.

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MRSA skin infections are increasing –and therefore also an increasing problem for healthcare workers and their relatives

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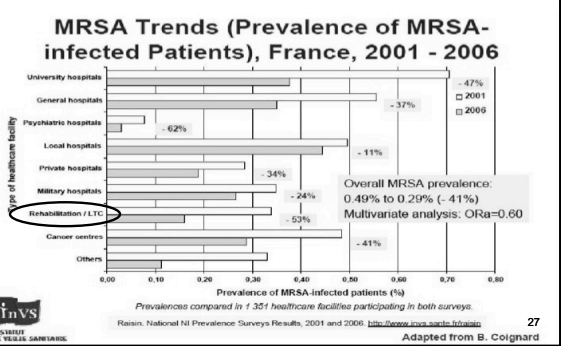
In France, a reduction of MRSA is observed - also in LTCF



Adapted from B. Coignard

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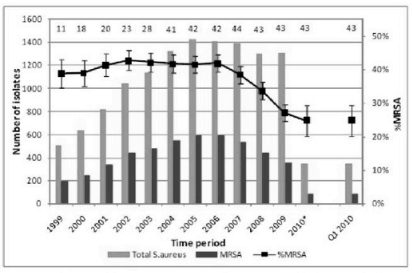
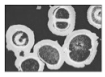
The MRSA-trend- may also fall in some EU –countries and in USA





•EARSS 1Q 2010 a

Figure 1. Trends for *S. aureus* – total numbers of *S. aureus*/MRSA and percentage MRSA with 95%CIs

* Data for 2010 are provisional; the numbers of participating laboratories by year-end and by quarter are indicated above the bars

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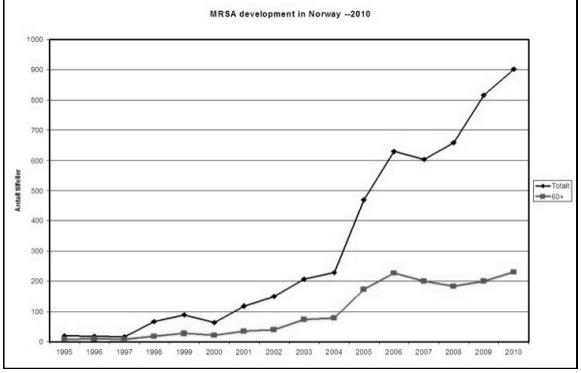
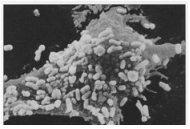
But is still increasing in Norway



Other resistant microbes may increase in Long term care

- **Resistent cocci- other than MRSA**
  - Vancomycin-resistant enterococci,
  - Penicillin - resistant pneumococci
- **Gram negative rods with extended beta-lactamase production (ESBL)**
  - E coli --ST131 (O25:H4) worldwide - community-associated UTI and bacteremias. Resistant to most antimicrobials.
  - Klebsiella, Enterobacter (wounds, UTI)
  - Citrobacter, Serratia—(wounds, UTI)
- **Other very resistant rods**
  - Pseudomonas sp,
  - Acinetobacter



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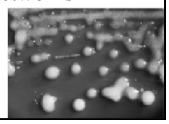
Very resistant Gram negative rods-

like NDM-1 (New Dehli metallo –beta - lactamase-1)

Main problems are:

- Resistant to all beta-lactam antibiotics and often to most other antibiotics
- Few treatment options and --severe outcome
- Spread of resistance by
  - Resistant genes
  - Cross-contamination via patients and staff
  - Environmental contamination
  - Transfer of patients and personnel within and between healthcare institutions, networks and countries
- Lack of molecular global surveillance networks
- Lack of infection control



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Distribution of mobile metallo-beta-lactamase = bacteria resistant to all penicillins, cephalosporins and carbapenems

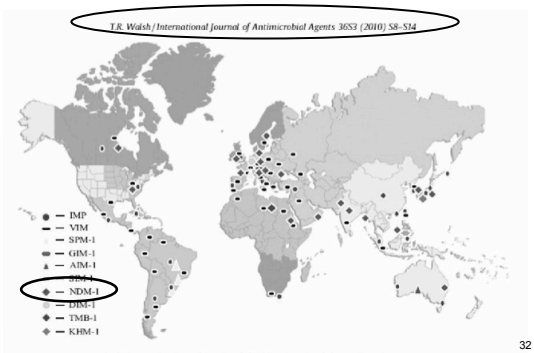

Fig. 3. Representation of the global distribution of mobile metallo-β-lactamases.

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The risks of medical tourism is transmission of antibiotic resistance

NDM-1 superbug mutation shows up in New Delhi drinking water
(Toleman, Walsh et al)

A girl collects drinking water at a tank

THE RISKS FROM MEDICAL TOURISM

AS many as 50,000 Britons travel overseas for medical treatment each year - many of them unaware or unwilling to consider the health hazards.

India is one of the most popular destinations, along with Turkey, Hungary and other eastern European countries.

But research has revealed high rates of severe wound infections, HIV and hepatitis B and poor surgical technique.

'Sun and surgery' packages to India, including flights, operations, accommodation in a private hospital and recuperation time on the beach, have been sold by major tour operators.

Many private operations are significantly cheaper than in Britain.

The market is worth millions of pounds, with surveys suggesting dentistry is the most popular service followed by cosmetic surgery.

But there have also been scandals where Britons visiting India as 'transplant tourists' for black market kidneys from living donors died or suffered serious complications.

The British Association of Aesthetic Plastic Surgeons warns patients to investigate the credentials of clinics and surgeons, and says private cosmetic surgery in the UK often costs more because of better regulation here.

Cosmetic surgery: Growing market

Reasons for hospitalization in India or Pakistan

14 UK source patients infected with super resistant NDM-1 bacteria in India or Pakistan–

- **Renal or bone marrow transplantation**
- **Dialysis**
- Cerebral infarction
- Chronic obstructive pulmonary disease
- Pregancy
- Burns
- Road traffic accidents
- **Cosmetic surgery**

"OK, Mr. Feldman, You're all prepped for surgery

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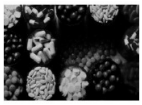
The basic problem of resistance is the overuse of antibiotics –

"bought on the street"

In USA - the
- amazing misuse and therapeutic nihilism concerning antibiotics ” serve as efficient multiplier of these isolates”---(Promed-mail April 6 2011)



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The specific infection control problems

that arise in this setting--
III

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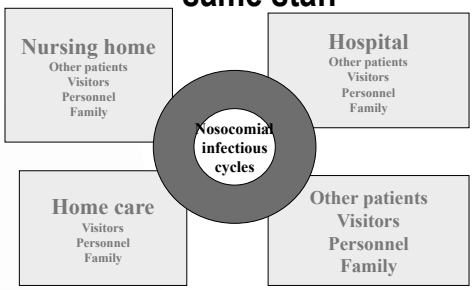
We are sharing the same patients, microbes, visitors, -and often the same staff--



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The specific infection control problems in nursing homes

- **The patient:** with reduced physical and psychological condition, mixed medical clinical illnesses, breaks in the skin, invasive devices--
- **Needs close and repeated assistance;** personal hygiene, toilet, nutrition, dressing-undressing, walk-training etc (Sie et al 2008)
- **Long duration of patient contact -** strongly associated with bacterial contamination on the staffs' hands
- **Contact transmission is a special problem – but also airborne transmission-without isolation possibilities**
- **Shared living quarters with other patients, personnel and visitors**
- **Exposed to shared equipment**, often **not** properly sanitized between residents
- **The transmission problem may be poorly understood** - personnel, patients and visitors - and
- **Shortage of hand hygiene and glove use** Thompson et al. ICHE 1997;18:97-103
- **Infections/colonization may under such conditions spread quickly**

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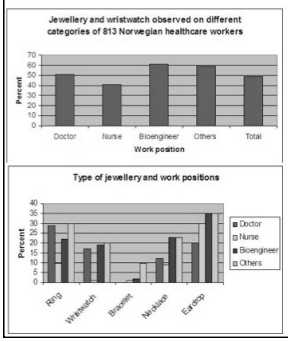
Hand hygiene compliance is a problem, and the use of jewellery inhibits good hand hygiene. There are also more bacteria on hands when wristwatches are used! Jeans et al. JHI 2010;74:16-21



Risk of infection from the wedding ring!

Study by infection control nurses, OUS-Ullevål 2009

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There are many guidelines- and consensus conferences for LTCFs ----

- International guidelines; WHO, CDC, EU,---
- National guidelines
- HICPAC guidelines
  - UTI 2009
  - Disinfection and sterilization 2008
  - Isolation 2007
  - Multidrug resistant organisms 2006
  - Influenza vaccination of HCW
  - Environmental infection control
  - Hand Hygiene 2002
  - Infection control in HCW 1998
  - Immunization of HCW
- SHEA/APIC guidelines for LTCFs 2008
- IDSA guideline for clinical symptoms of infection in LTCFs 2008
- Consensus conferences for use of antibiotics in LTCFs; ICHE 2000, 2001
- Definitions of infections for surveillance in LTCFs; AJIC 1991

CDC March 15, 2010, Divison of healthcare quality promotion

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- "But long-term care don't have the resources available" Dr Andrew Simor, Canada 2009

- **Canada: Most of the nursing homes did not conduct all recommended infection surveillance and control activities**
- Dr Dick Zoutman, Queen's University in Kingston, Am J Infect Control 2009. Canada 2006
- **Norway 2010: low staffing rate**
- **Staff without training in infection control work**
- (Sie et al 2009)

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Low staffing rate, low education and missing guidelines/routines ?

- **Norwegian nursing homes have a low staffing rate of nurses and doctors per resident**
- **70% of the staff are without training in infection control work and 30% have <u>no health care qualifications at all</u>**
- **Part -time-work: Hospital staff with part-time job in nursing homes; "may transmit pathogens in both ways"** (Sie et al JHI 2009)

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Overcrowded and understaffed nursing homes may -

- **Increase the infection pressure**
- **Increase levels of MRSA infections and of other "super bugs"**
  - Clements et al The Lancet Inf Dis 2008; Australia
  - Dr Zoutman, Queen's University, Canada. Hamel et al. Am J Inf Control 2010;38:173-181

-**"Each time you get a <u>new roommate</u> your risk of acquiring these serious infections (like *Clostridium difficile, MRSA, vancomycin-resistant enterococci)* increases by 10 %"**

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Shortage of resources >> original solutions !


Daily Mail, Saturday, April 14, 2007

Don't wash sheets ...turn them over

Astonishing order at a hard-up hospital

By Daniel Martin
Health Reporter

CLEANERS at an NHS hospital with a poor record on superbugs have been told to turn over dirty sheets instead of using fresh ones between patients to save money.

Housekeeping staff at Good Hope Hospital in Sutton Coldfield, have been asked to re-use sheets and pillowcases wherever possible to cut a £500,000 laundry bill.

Posters in the hospital's linen cupboards and on doors into the A&E department remind workers that each item costs 0.275 pence to wash.

Good Hope reported a deficit of £6million last year and was subject to a report by the Audit Commission because of its poor financial standing.

It recorded 36 cases of MRSA from April last year to January, while cases of clostridium difficile have more than doubled in less than a year to 327. A Government hit squad was drafted in to solve the infection problems last year but the trust is still failing to hit MRSA targets.

Tony Field, chairman of Birmingham-based MRSA Support, said: 'Is that all the safety of a patient's life is worth? 0.275 pence?

... have been taken down by now. But a medic insisted the posters were still on display in A&E and the maternity unit as recently as the past month.

'It is clear the trust is encouraging staff to "top 'n' tail" used sheets on a bed instead of ...

... spokesman John Baron said: 'This sounds ludicrous and is a real cause for concern given that MRSA is such a problem in our hospitals.

'This matter needs to be investigated at a higher level.

... dards of cleanliness. The idea of turning over sheets like this is extraordinary and scandalous.'

The scheme is one of many ways that cash-strapped trusts are trying to save money.

In January, staff at West Hert...

Hospital corners: Nurses being taught how to make beds in the 1950s

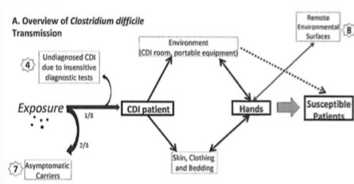
Are nursing homes built for modern infection control?

- **50% of nursing homes in Oslo are not suitable for modern patient care - the oldest is from 1860**
- **Are there isolation facilities? – also for airborne infections ?**
- **Is the structure and environment adapted to effective infection control?**
- **Are the patients beds in the corridor? Not usually, but common in our hospitals!**

45

What about hygiene?

- "**Infections thrives in dirty places--**."
- "**People bring infection on their hands into work –**
- **During the day, pathogens are added to desk surfaces, the arms of office chairs, keyboards and equipment."** UK 2010 Health Care Education blog Feb 15.2010



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Uncleaned areas may transmit agents like pandemic influenza A (H1N1) virus -

- Surface swab specimens from patients with confirmed influenza A showed <u>living virus</u> on
  - Computer mouse
  - Hands
  - Bed rail
  - Wall
  - Sofa
  - Clothes
- Macias et al. JHI 2010;73: 280-281

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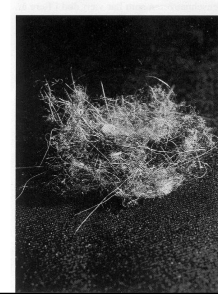
The environment is often dirty- the simplest way to spare money?

En kanin **A dust bug**



Strategies to Control Preventable Infections in Long Term Care Facilities

Prof. Bjørg Marit Andersen, Oslo University Hospital, Norway

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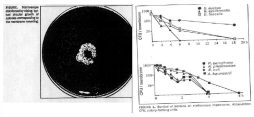
Are we using contaminated equipment?

Like stethoscopes, blood pressure app., computers, mobil phones, respiratory devices aso.



In som UK hospitals, MRSA is detected on 25% of computers what about MRSA in LTCFs?

Oxygen concentrator with dust and bacteria

CPAP- inner part with bacteria and fungi

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Are blood borne infections increasing ?

- **Because of -failure to adhere to fundamental principles of infection control?**
- HBV transmission among 1701 persons at risk –> 97 infected (5.7%) (Thompson et al, Ann Int Med 2009; 150:33-39).
- **"Sharing fingerstick devices and/or glucometer among diabetic residents" is a risk**
- **New emphasis on glucometer cleaning/disinfection - 2010 (CDC guideline)**

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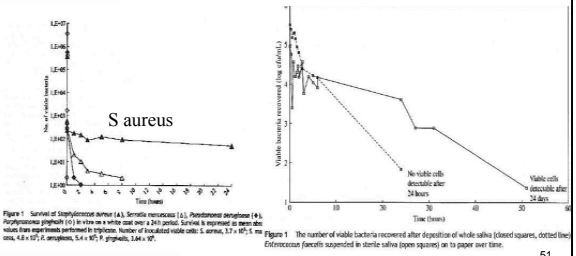
Are we using contaminated textiles and paper?

Survival on white coat
Reijden et al. JHI 2009 73;283

Survival on paper
Hope JHI 2009;73:282



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Is there cross-contamination via food and water by "self service"?

-can the patient/visitors/others touch the food and drink of other patients?

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Isolation – is the specific infection control problem- because of

- **Shortage of isolates and resources for isolate treatment**
- **Shortage of nurses, knowledge and personal protective equipment (PPE)**
- **Patients need more contact and treatment**

However, patients in <u>short-term isolation</u> in hospitals has shown a positive attitude towards isolation. Wassenberg JHI 2010;75: 124-127

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MRSA; a challenge to Norwegian nursing home personnel

Thorstad M, Sie I, Andersen BM. Interdisciplin Perspect Infect Dis 2011, Article ID 197683

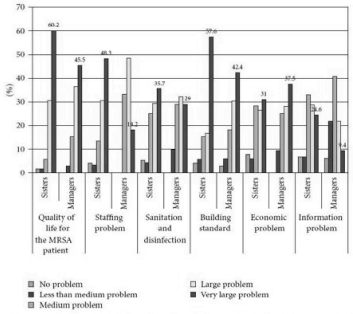


Figure 3: Nursing home problems associated with MRSA: quality of life, staffing, building standard, economy, information, sanitation, and disinfection.

Persistent MRSA predominates

Manzur & Gudiol Clin Microbiol Infect 2009; 15:26-30

- More than half (60-65%) are persistent colonized
- Nearly 1/3 colonized develop serious infections
- Long-lasting carriage/infection
- Can transmit MRSA to others

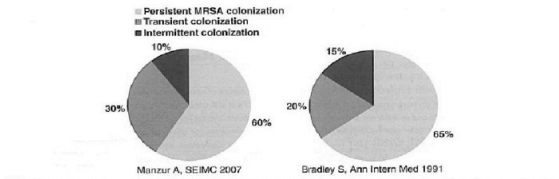


FIG. 1. Methicillin-resistant Staphylococcus aureus (MRSA) colonization among residents in long-term-care facilities: relative frequency of persistent vs. transient carriage.

MRSA contamination and density

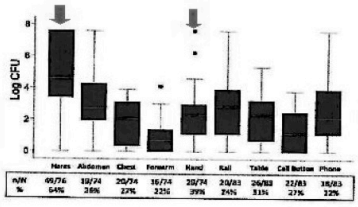


FIGURE 1. Prevalence of contamination of commonly examined skin sites and environmental sites with methicillin-resistant *Staphylococcus aureus* (MRSA) and the density of colonization. Data at

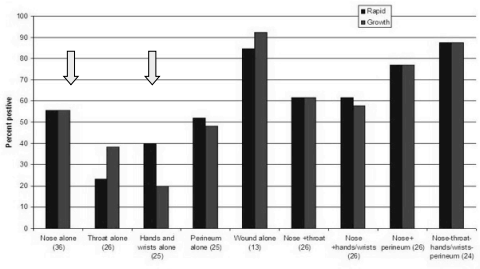
- After 1 day the environment is contaminated ---
- MRSA may be airborne – aerial dispersal - all over the room

Gehanno et al. JHI 2009; 71: 256-262 BM Andersen OUH Norway

Body site colonization may vary

Yang et al Clin Microbio Infect 2010;16:425–431
Andersen et al. J Infect 2010; 60:293-300

Distribution of MRSA between anatomical sites. Number in parenthesis are persons tested



Andersen et al. J Infect 2010; 60:293-300

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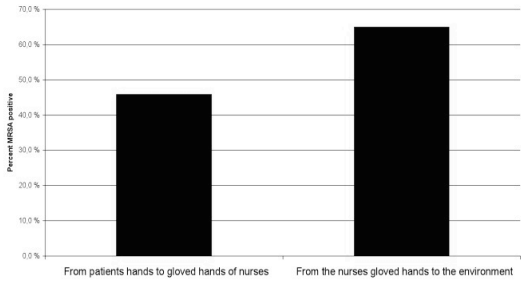
"MRSA is primary transmitted by the hands of healthcare workers"

Ludlam JHI 2010;74:296

MRSA transmission from MRSA patients
Ludlam et al JHI 2010; 296-299



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How infection control problems may be addressed

IN LONG-TERM CARE FACILITIES
IV

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Infection control is more difficult to perform in the LT care and homecare than in hospitals

It is important to identify the infectious patient *before* he/she cross-contaminates

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Strategies to Control Preventable Infections in Long Term Care Facilities

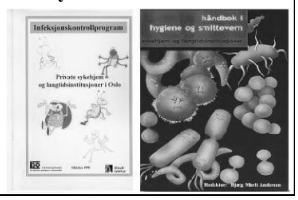
Prof. Bjørg Marit Andersen, Oslo University Hospital, Norway

Infection control and report by law

- **Health care associated infections should be reported - to control the quality and safety of care.**
- **Prevalence survey are done in 5 of 33 countries in Europe** Moro et al. ICHE 2010;31:59-62
- **Infection control – by law (act)- is present in 8 of 33 countries in Europe** Moro et al. ICHE 2010;31:59-62
- **Norway: Infection Control Law – and Instruction for all health care services concerning infection control** (Smittevernloven 1994, Forskrift 2005).

An infection control programme – by law (act)- is needed

- **All nursing homes (96%) in Oslo county have written infection control programme** Sie et al. Tidsskr Nor legeforen 2008;126:1528
- **But more important is to look at how infection control is implemented in daily work – for instance by external visits and reports by dedicated infection control personnel**



Information and communication is needed

- **Report infections and outbreaks to whom it may concern, dependent on the infectious agents-**
  - **to own staff (nursing handoffs), the hospital, other nursing home, or homecare that have treated the patient**
  - **and to the staff that may have been exposed to infection (MRSA)**
  - **and serious infections/large outbreaks – to the authorities- local- country**

Organization and structure is basic

- **The nursing home should be planned and structured for infection control, which is = good quality, efficiency and - probably - cost benefit**
- **Isolation room** with anteroom for patients with infections (tuberculosis, MRSA and other resistant bacteria, influenza, norovirus, CDI--)
- **Single patient rooms-** since sharing rooms- "Increases risk of "super bugs" - by 10%" Dr Dick Zoutman Jan 5th 2010. Am J Inf Control
- **Single bathrooms -** since common bathrooms increases microbial transmission pressure
- **Clean food service** – "self service" - increase the transmission pressure
- **Personal should use uniforms – changing daily –** to avoid cross transmission of microbes
- **Cleaning daily (at least 5 days/week) of the patients room and bathroom – no dry mopping!**
- **Avoid overcrowding and understaffing - since this increases levels of MRSA and other infections "** Clements, Lancet Infect Dis 2008

Prevent spread of infection

- **Preven *exposure* to infections;** resident, employee, family and visitor - by isolation and disinfection
- **Educate and train** all personnel in the basics of infection control and prevention-
- **Surveillance;** by prevalence, incidence or separate outbreaks, with report to the public and local authority
- **Screen patients and personnel exposed to MRSA**
- **Screen patients exposed to VRE and other multi – drug- resistant- organisms (MDRO)**
- **Isolate infected/probably infected patients and disinfect contaminated rooms and equipment**

Prevent antibiotic-resistant "superbugs " by-

- **Preventing infections**; hand hygiene, personal hygiene, clean caring, isolation, etc.
- **Following good quality hygienic procedures for care and treatment**; avoid catheters and pressure ulcer; good hygiene when handling food, medicines, eye-drops, etc.
- **Dedicated doctor in charge**. Regular and continuous supervision by a dedicated practitioner (1-5 days/week in the long-term institution)
- **Antibiotic exposure** is significantly associated with MDR gram-negative bacteria! (Fallon et al. ICHE 2010;31:1148-1153)

Identify - and "treat infection, not colonization or contamination "

(CDC campaign, March 2004)

- **Identify microbes with resistance patterns**
- **Avoid unnecessary use of antibiotics**
- **Avoid use of broad** spectrum antibiotics
- **Do not treat viral infections** with antibiotics

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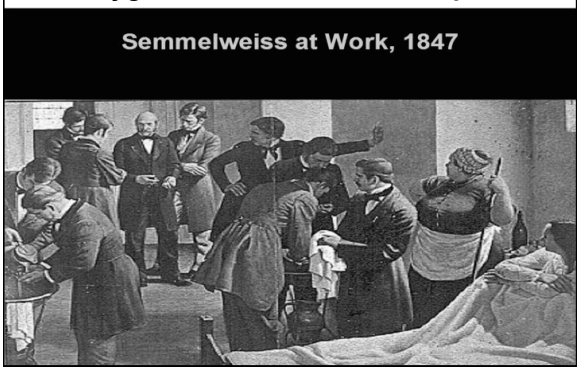
Increase and control hand hygiene for the staff and the patients!



Hand hygiene programmes are important!

- ***Staff education*** **reduces respiratory illness in LTCF** (Falsey et al.ICHE 1999;20:200-202)
- **There is a simple linear relationship between MRSA and *hand-hygiene compliance*** (Nicolau et al. JHI 2010)
- **"The public right to know "– and to ask concerning hand hygiene** (Fletcher JHI 2009; 73: 397-399)
- **World Health Organization** (Sax et al. WHO. Am J Infect Control 2009;37:827-834)
  - "Clean care is safer care"
  - "My five moments for hand hygiene"
  - "Hand hygiene into health care practice"
- **If there was at least 40% compliance with hand hygiene- this would protect against outbreaks !** (Talon et al. JHI 2009 ;72: 178)
- **But the compliance rate should be →>>>100% !**

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There is significant reduction of MRSA when increasing the consumption of alcohol hand-rub

S. Sroka [a,b,*], P. Gastmeier [a,b], E. Meyer [a,b]

Journal of Hospital Infection (2010) 74, 204–211

Impact of alcohol hand-rub on MRSA 209

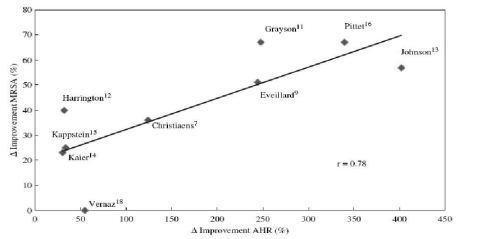

Figure 3 Difference (%) in the improvement of alcohol hand-rub (AHR) use and the change in meticillin-resistant *Staphylococcus aureus* (MRSA) rates (%) in studies from Table I. (%: MRSA parameter according to the endpoints in the studies.)

- **A linear relationship between MRSA and *hand-hygiene compliance*** (Nicolau et al. JHI 2010)

70

Avoid "medical tourism" with negative effects for inhabitants – and risk for import of very resistant strains

NaRanong A & NaRanong V Bull WHO Org 2011; 89: 336-344

- **Thailand's experience**
- "The negative effect for the Thai society stem from having to provide health-care services for 420 000 to 500 000 *medical tourists* annually with the same number of health-care staff"
- -"these negative effects are evidenced by both a shortage of physicians and by increased medical fees for self-paying Thais, which are likely to undermine their access to quality medical services.
- –In India, similar adverse effects have been detected"

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Avoid other important risks of microbial transmission

- **Avoid unnecessary transport of patients between many departments and healthcare institutions**
- **Avoid part-time jobs for the staff; staff in work at many healthcare institutions at the same time**
- **Avoid personnel and visitors with infectious diseases until they does not transmit infections**

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Strategies to Control Preventable Infections in Long Term Care Facilities

Prof. Bjørg Marit Andersen, Oslo University Hospital, Norway

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Prevent urinary tract infections by preventing catheters!

- **Remove "hospital-catheters"!**
- **Use urinary catheter reminders or stop orders !**
  - (Meddings et al. CID 2010;51: 550-560.
- **Avoid long-term catheter -> prefer single use, sterile catheter,- if necessary**
- **Regular toilette training and use of incontinence equipment**
- **Ask the doctor in charge!**

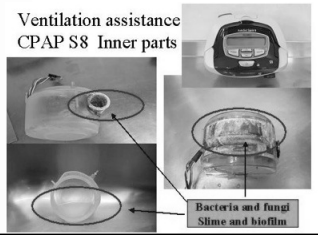
Prevent respiratory infections by-

- **Enhanced oral hygiene:** may reduce pneumonia and death!
  - P Sjøgren- Evid Based Nurse 2009; 12:55, Bourigault et al. JHI 2011;77:76-92
- **Vaccination:** dual pneumococcal and influenza vaccination may even prevent infarct and stroke ! (Hung et al CID 2010;511007)
- **Isolation** (contact+airborne)- until – at least- 24 h free of symptoms – single rooms or kohort
- **Use personal protective equipment when needed**
- **Mask for the patient outside room - separated from others**
- **Cough/sneeze etiquette – Not in your sleeves!**
  - **Andersen BM. *J Hosp Infect* 2010; 75: 73-74.**

- **Access control.** Sick persons should stay at home
- **Screening, diagnostic testing**
  - **CDC Interim Guidance Influenza October 14, 2009.**

Reduce respiratory infections – associated with infected equipments

- **By cleaning outer and inner parts of respiratory equipment regularly**
- **Always before reuse!**



Prevent spread of gastrointestinal infections

The patient should be treated

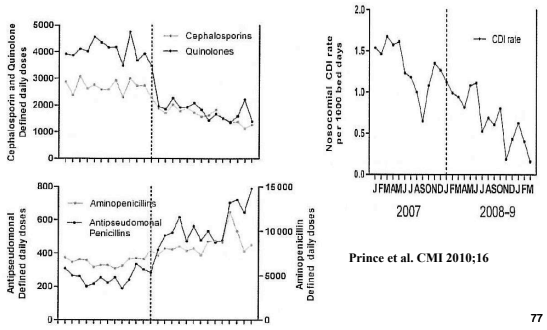
- **In single room isolation** -early
- **Personal should use gloves, gowns and room-bound shoes/ overshoes** –and mask/cap if suspected norovirus
- **Daily cleaning and disinfection** is important

Residents, visitors and personnel should follow written advises

- **Access control.** Sick persons should stay at home
- **Hand hygiene and personal hygiene before and after**
- **Outbreak (more than 2):** close for new admissions

Staff with gastroenteritis –suspect *norovirus*: stay at home until 2 days after the last symptoms

Reduce/change antibiotics and reduce CDI!



Prince et al. CMI 2010;16

There are few MRSA studies from nursing homes -

Cochrane review 2008-2010

- **"In the meantime, nursing homes can take advantage of lessons learned from hospital research."**
- **Reference: Hughes CM, Smith MBH, Tunney MM. Infection control strategies for preventing the transmission of meticillin-resistant Staphylococcus aureus (MRSA) in nursing homes for older people (Review). The Cochrane Database of Systematic Reviews 2008 and 2010 Issue 1.**

Hosted by Paul Webber paul@webbertraining.com
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Strategies to Control Preventable Infections in Long Term Care Facilities

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Prevent MRSA in Long term care!

Patients and personnel should not be the "twenty-first century lepers!"
(Mozzilo et al. JHI 2010; 132-134)

- **Hand hygiene and the use of personal protective equipment**
- **Isolate (or remove from duty)** MRSA-positive cases and start decolonization
- **Disinfect contaminated environment and equipment**
- **Screen all staff and patients expose to MRSA, multiple- sites: nose, throat, perineum and hands/wrists** (drains, wounds, eczema etc)
- **Restrict work and visit of MRSA-positive persons until MRSA - negative**
- **Flag MRSA in the journal- as critical information**
- **Minimize use of medical devices and decontaminate after use**

- Andersen et al. J Infection 2007;55:531-538,
- French GL, Clin Microb Infect 2009; 15 (suppl 7):10-16.
- Institute for Healthcare Improvement, USA

Decolonize MRSA cases - and follow up

- **Recommended to inhibit infection and transmission**
  - **Skin disinfection**: Whole-body washing or bathing with an antiseptic-detergent, including hair (4% chlorhexidine, 7,5% povidone-iodine, 2% triclosan, or octenidine hydrochloride, --)
  - **Topical intranasal treatment** (mupirocin, polyhexanide (prontoderm),octenidine dihydrochloride or other local)
  - **Environmental decontamination (chloramine 5%, perasafe, or local by chorhexidine-alcohol--), followed by cleaning with soap and water**
  - **And additional measures, see** Andersen et al. J Infection 2007;55:531-538
- **May fail – repeat and take care of environmental MRSA**
  - Mupirocin resistance may develop
  - Throat colonisation – often difficult to treat
  - Age > 80 years
- **45-85% effective?**
- (Andersen et al. J Infection 2007;55:531-538, Longtin, Clin Microb Infect 2009;15:552-559, Ammerlaan et al. Clin Infect Dis 2009; 48: 922-930, Krishna JHI 2010;74:199, Madeo JHI 2010;74: 290, Gilpin et al. JHI 2010; 75: 93-98, Brian JHI 2010;75:141-142)

Reduce cross-contamination
by good *general* infection control routines

30% of air samples in the environment of MRSA-carriers may be MRSA positive

MRSA thrives up to 10mnths in dirty areas

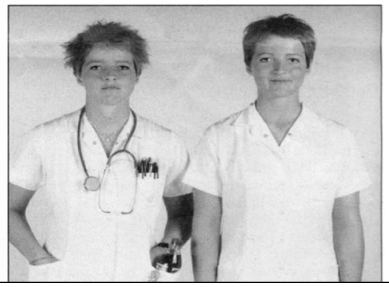
Cleaning and good care of the patient is important!

But here may bacteria also thrive if not cleaned ----!

Personal hygiene is not a personal decision in healthcare

Who would you prefer?

Tidsskr Nor Lægeforen



Personal hygiene – the staff should use uniforms

Clean textiles – prevents infections- should be washed in the institutions laundry

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There should be a good infection control for textiles in the laundry

Dirty side

Washing

85-95⁰ C

Clean side

85

Increase the general hygiene "Clean care is safer care!"

- Environmental hygiene (floor, tables, beds, bathroom--)
  - Reduces spread of infection
  - A good quality indicator
  - Reputation - related
- Contaminated rooms –
  - Good terminal disinfection
  - Followed by cleaning

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Clean rooms and furniture Every day- at least 5 days a week

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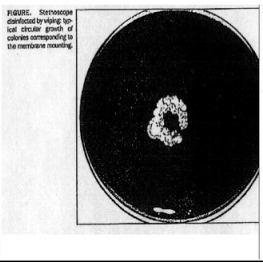
Prevent equipment-carried infections! Clean and desinfect equipments!

Stethoscopes, blood pressure app, blood sugar app, infusion pumps, aso



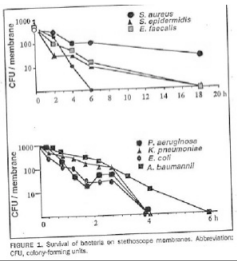


FIGURE 1. Survival of bacteria on stethoscope membranes. Abbreviation: CFU, colony-forming units.

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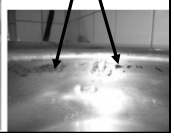
Clean and disinfect equipments used in patient care –

hot water (>85⁰C) is the best disinfection method!

-but control bedpans !



Equipment hygiene is important!

keyboards, mobil, respiratory equipment--

Clean computers and mobile telephones!

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Gas disinfection – the use of 5% hydrogen peroxide mist

Hydrogen peroxide robot in room with equipment	Hydrogen peroxide decontamination in a surgical department
Fig 1	

References
Andersen BM et al. *J Hosp Infect* 2006; 62:149-155
Ray A et al. *Infect Control Hosp Epidemiol* 2010; 31: 1236-1241

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Food and water (and drug) hygiene

- **Hand hygiene for all, included staff, before and after meals**
- **Patients with active infections or carrier state should not eat together with others**
- **Visitors should not serve food or drink to other patients (unless spec agreement)**
- **"Self service" should be omitted – because of norovirus and resistant bacteria - unless**
  - **"single packed food"**
- **The dish washer should not produce aerosols and the temperature should be at least 85^{0}C because of norovirus and enterococci**

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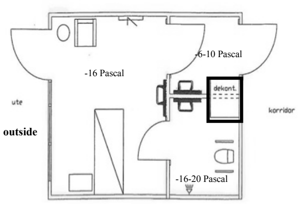
Learn to work with patients that are isolated and to use PPE - when needed
-negative air pressure isolate for airborne infections



Negative pressure isolate: 29m²
- **Sluice**
- **Patient room**
- **Bathroom with through-put decontamination**

Isolat med ekstra hygiene tiltak. 1:50
Sengerom:18.4 m2 Sluse: 4.8 m2 Bad: 6 m2 Totalt: 29.2 m2
Seng i pleiestilling.
Mulighet for skinneheis i taket mellom seng og toalett. Automatisk døråpner ved trykk med foten.
Lett tilgjengelig handvask utenom badet.
Hygieniske håndvasker i corian, med lite porer.
Automatisk døråpner i hoftehøyde for rullestolbrukere. Oppbevaring i sluse.
Gjennomgående dekontaminator mellom sluse og bad. Direkte inngang utenfra til isolatet.

Håndbok i hygiene og smittevern for sykehjem og andre langtidsinstitusjoner 2006

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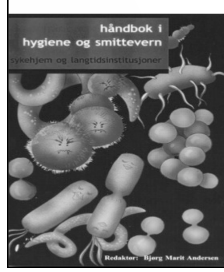
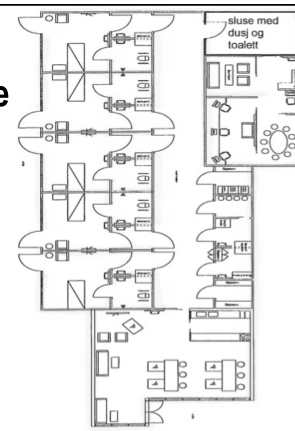
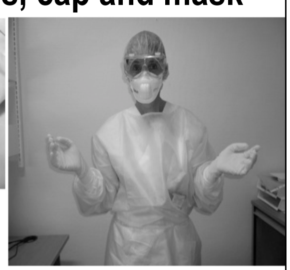
Isolation unit in nursing home





PPE: Gown, gloves, cap and mask


Gloves with long cuff




-adjusted to the suspected microbe/ infection

Learn/train to dress and undress PPE! --

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Infection control in nursing homes – the future?

- **"Preventable infections are unacceptable"** –the "consumer empowerment" Geberding/Frieden ICHE 2010
- **Still---Infections in LTCFs are increasing** - to monitor is important because of globalisation of patients, staff and microbes. Harmonisation of measures are therefore needed
- **Infection control problems** may be more difficult and expensive to solve in the future
- **Basic learning of infection control** in medicine and other healthcare education is faulty. A more practical **learning and training** of doctors and care givers is very important
- **Isolates and single rooms are needed** – to avoid spread of infections
- **Laboratory services** are needed for diagnosis and good antibiotic stewardship!
- **The quality of care and infection prevention** should be similar in all types of healthcare and adjusted to the special need in nursing homes and home care

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Strategies to Control Preventable Infections in Long Term Care Facilities

Prof. Bjørg Marit Andersen, Oslo University Hospital, Norway

Sponsored by Diversey Inc www.diversey.com

Is there any strategy for preparedness of epidemic crises in LTCF ??

What about elderly in existing nursing homes if a serious pandemic turn up next time-

like avian influenza or SARS ?

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A nursing home is not "a home" – it is a

- A place for care and treatment -
- Together with a lot of other people -
- In hands of more or less educated personnel -
- With a more and less economic power –
- With increasing intolerance for preventable infections -

- The control of present and new infectious diseases is dependent on reduction of transmissions and infections
  - In primary health care
  - In long term care and home care
  - In hospitals
- we are sharing the same patients – and
- the weakest part of the infection control chain may perhaps . healthcare --

Nosocomial infection control

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- **"It's critical that vulnerable long-term care residents be protected from largely preventable infections "**
- Queen's University, Dr Zoutman, Canada, 2010
- **"Nursing homes should prepare now for new infection control expectations"**
- MacKenzie Kimball 24 July 2009

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Thank you for listening!

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COMING SOON …

26 October 11	(South Pacific Teleclass) **Public Health Lessons Learned From the Christchurch Earthquakes** Speaker: Dr. Ramon Pink, University of Otago, New Zealand
27 October 11	**The Role of Microbial Biofilms in Chronic Bacterial Infections** Speaker: Dr. William Costerton, Center for Genomic Sciences
03 November 11	**How Should We Clean Our Hospitals** Speaker: Dr. Stephanie Dancer, NHS Lanarkshire, Scotland Sponsor: Diversey Inc (www.diversey.com)
10 November 11	**Infection Prevention Challenges in Home Care** Speaker: Mary McGoldrick, Home Health System Inc.
17 November 11	**Overview of the New HICPAC Norovirus Guideline** Speaker: Dr. Taranisia MacCannell, Centers for Disease Control, Atlanta Sponsor: Virox Technologies Inc. (www.virox.com)
01 December 11	**Strategies for Improving Hand Hygiene Compliance in the ICU** Speaker: Dr. Alexandre R. Marra, Hospital Israelita Albert Einstein, Brazil Sponsor: Deb Ltd (www.debgroup.com)
07 December 11	(Free WHO Teleclass) **Best Practice for Cleaning, Disinfection, and Sterilization in Healthcare** Speaker: Prof. William Rutala, University of North Carolina

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