Feces Management: Time to Address the Risks

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Objectives

- Review mode of transmission and portal of entry related to multi-drug resistant organisms (MDRO)
- Discuss areas in healthcare that need more attention
- Propose ideas for discussion

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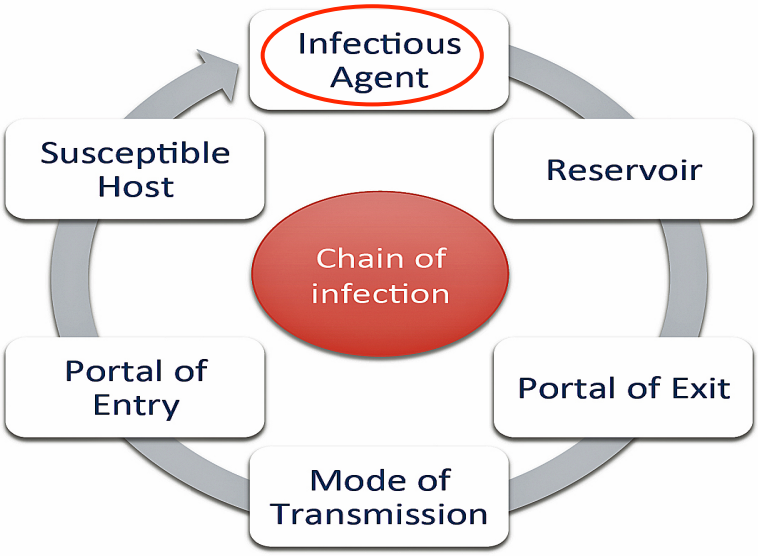
Chain of Transmission



http://diseasedetectives.wikia.com/wiki/Chain_of_Transmission

Infectious Agent

- Vancomycin Resistant Enterococci (VRE)
- Extended Spectrum Beta Lactamase (ESBL)
- Carbapenemase-producing Enterobacteriaceae (CPE)
- *Clostridium difficile* (CD)
  - Not truly an MDRO

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Infectious Agent

- Methicillin Resistant *Staphylococcus aureus*
  - Yes, that bug…
- Ebola
  - Yes, I know it is not an MDRO by definition

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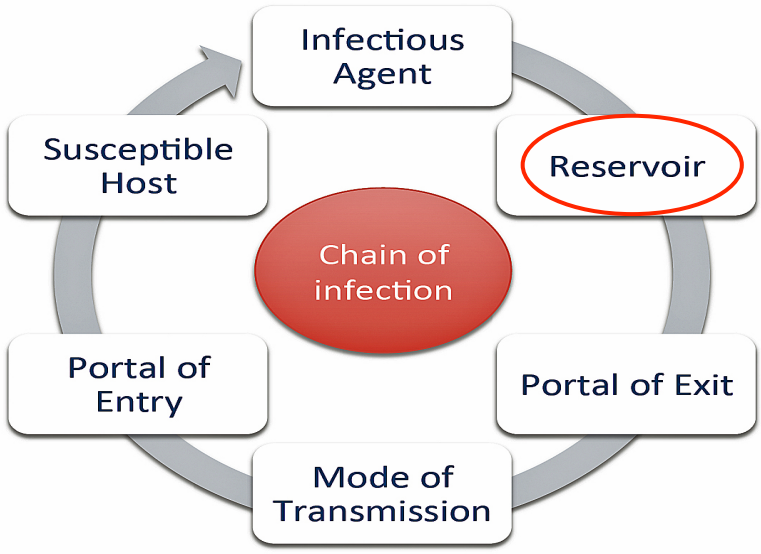
Chain of Transmission



http://diseasedetectives.wikia.com/wiki/Chain_of_Transmission

Reservoir

- Feces
- fe·ces fi siz/ [**fee**-seez]
- –noun (used with a plural verb)
  - 1. Waste matter discharged from the intestines through the anus; excrement.
  - 2. Also, especially British, faeces.
    - Origin 1425-75; late middle English from Latin faecēs – grounds, dregs, sediment

*www.dictionary.com
- Dictionary.com unabridged V1.0.1

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Reservoir

- Urine
  - Colonization common
  - Especially elderly patients
  - Catheterized patients

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Reservoir

- Sputum
  - Common in elderly, intubated (Garcia 2005)
  - Not applicable to this presentation

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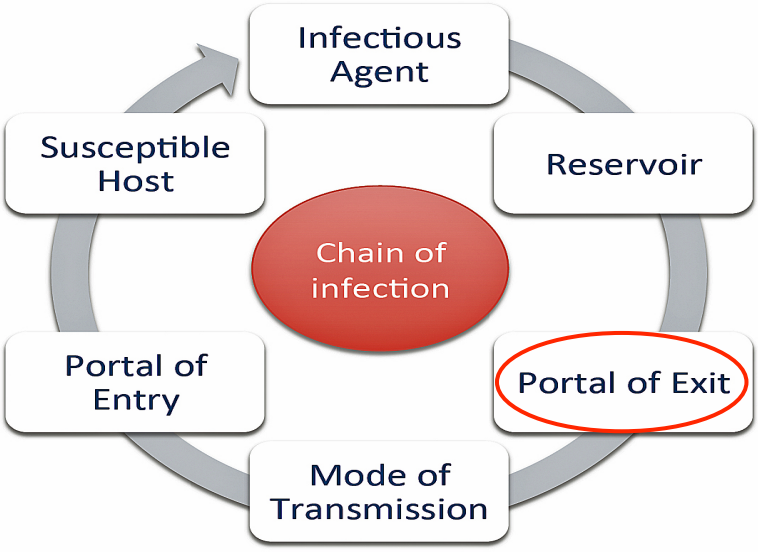
Chain of Transmission



http://diseasedetectives.wikia.com/wiki/Chain_of_Transmission

Portal of Exit

- Defecation
  - Formed, soft, loose
  - www.continence.org.au (O'Donnell 1990)
- Urination

Bristol Stool Chart

Type 1	Separate hard lumps, like nuts (hard to pass)
Type 2	Sausage-shaped but lumpy
Type 3	Like a sausage but with cracks on its surface
Type 4	Like a sausage or snake, smooth and soft
Type 5	Soft blobs with clear-cut edges (passed easily)
Type 6	Fluffy pieces with ragged edges, a mushy stool
Type 7	Watery, no solid pieces. **Entirely Liquid**

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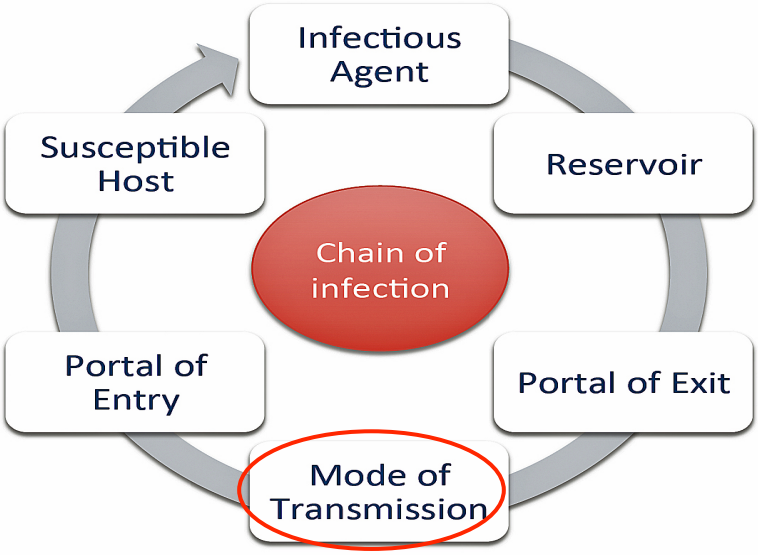
Chain of Transmission



http://diseasedetectives.wikia.com/wiki/Chain_of_Transmission

Mode of Transmission

- Equipment
  - Bedpans, commode buckets, urinals, bed rails, toilet high touch surfaces
- Hands
  - Staff
  - Patients
- Aerosols?

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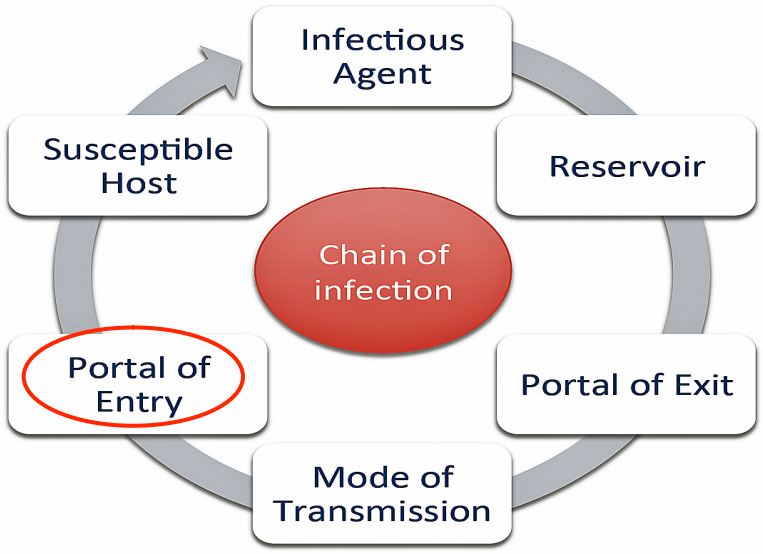
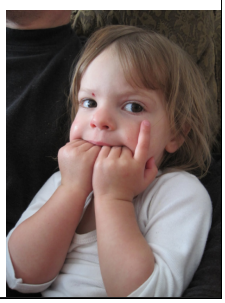
Chain of Transmission



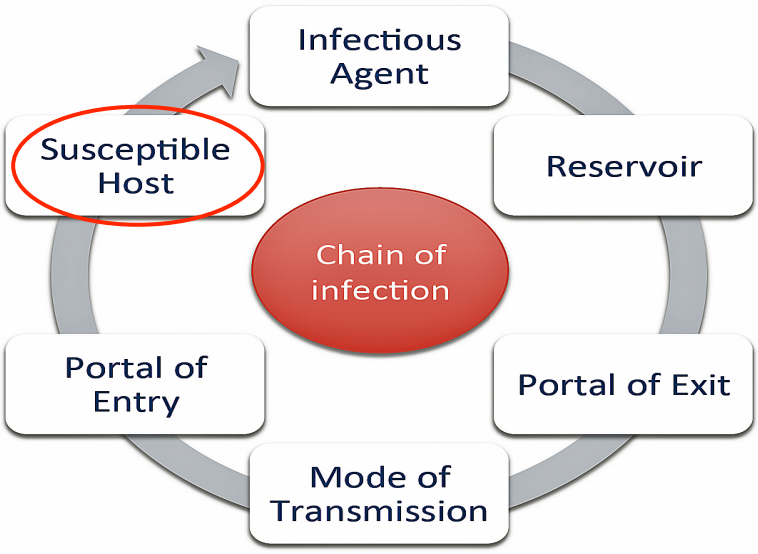
http://diseasedetectives.wikia.com/wiki/Chain_of_Transmission

Portal of Entry

- Rectum, mouth, non-intact skin
- Fecal – oral
  - Who puts this into the patient's mouth or rectum?
  - Rectum – endoscopes, gloved hands
  - Mouth – endoscopes, hands



Chain of Transmission



http://diseasedetectives.wikia.com/wiki/Chain_of_Transmission

Susceptible Host

- Our patients
- CDI
  - Proton pump inhibitors, antibiotics, hemodialysis, HIV, numerous hospital admissions (Bengualid 2011)
- CRE
  - International travel (Tängdén 2010)
  - Unrecognized colonized patient (Borgia 2012)

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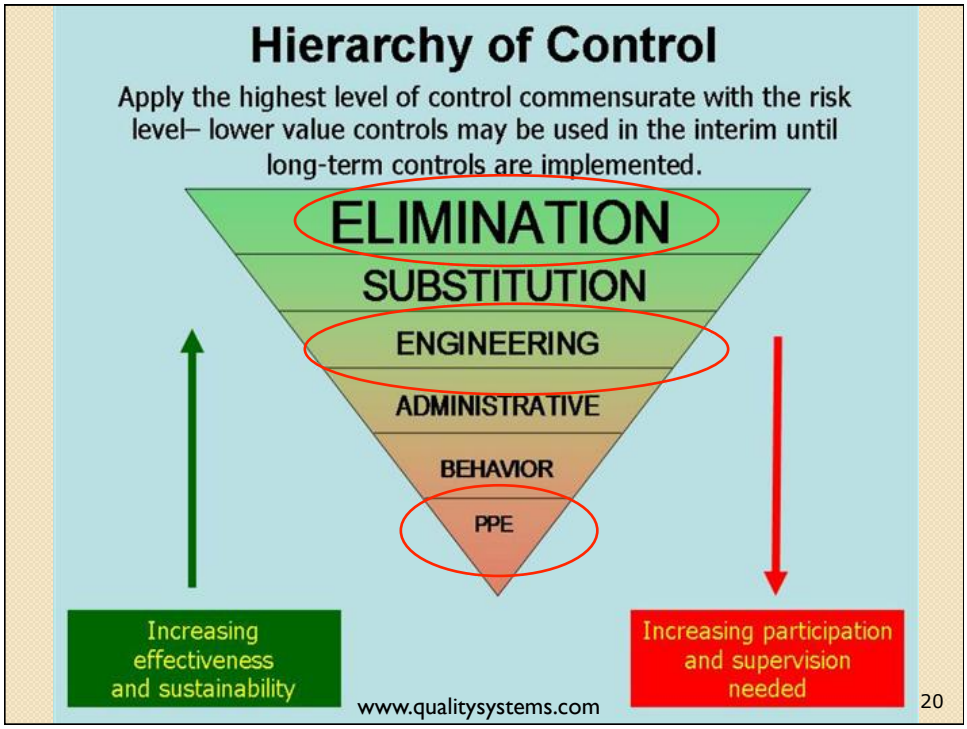
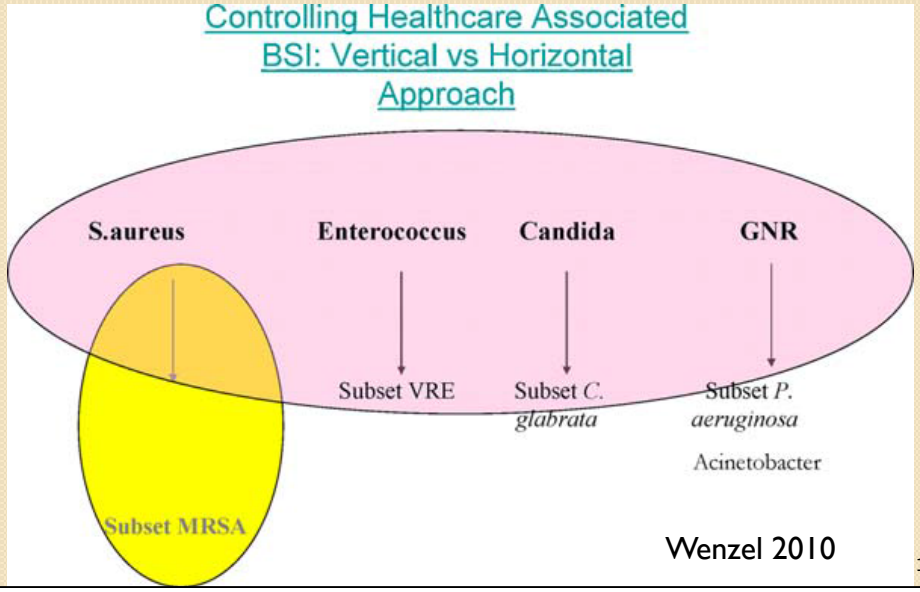


Horizontal vs Vertical Infection Control



Wenzel 2010

1

Horizontal

- Reduce rates of all infections for all pathogens
- Hand hygiene program
- Decolonization therapies (Chlorhexidine bathing)
- Board to ward (Nat Audit Office 2009)
- Antibiotic Stewardship Programs
- Cleaning and disinfection

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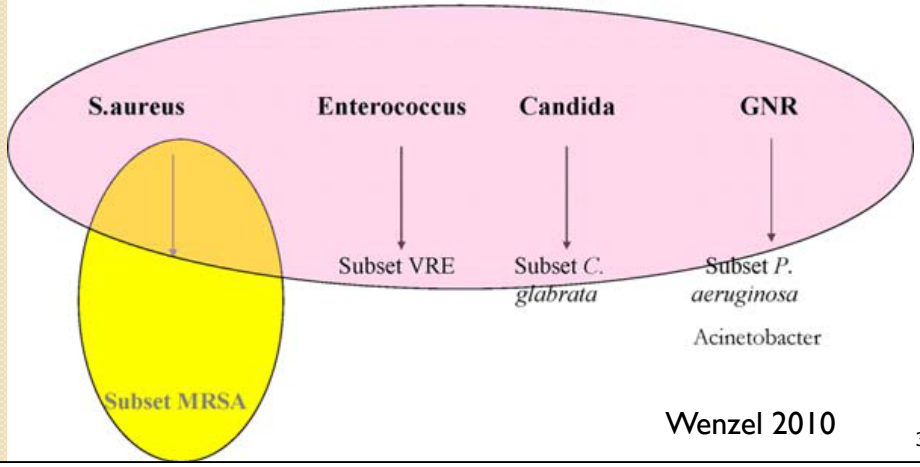
Horizontal vs Vertical Infection Control

Controlling Healthcare Associated BSI: Vertical vs Horizontal Approach



Wenzel 2010

3

Vertical

- Focus on a single pathogen or anatomic site
- Pathogen specific
  - MRSA
  - VRE
  - ESBL
  - CRE
  - Acinetobacter
  - Candida

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Modern Vertical Semmelweis

- Death by Group A Streptococcal puerperal sepsis
  - Screen for Group A only?
  - Only use an agent effective against gram positive cocci?
  - Only wash hands if in morgue?

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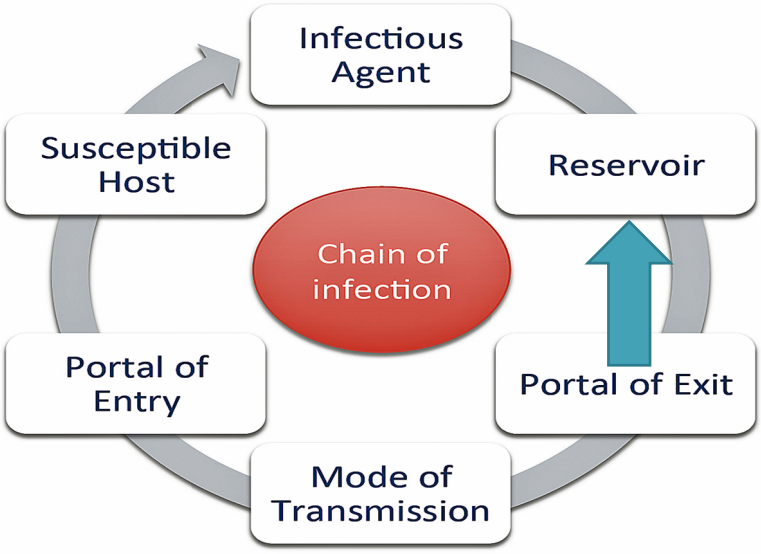
Chain of Transmission



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VRE in the Environment

- Grabsch 2006
- Colonized and past colonized VRE patients
- Structured exam, hemodialysis sessions
- Chairs positive in 36% outpatient, 58% hemodialysis
- Couch positive 48% OP, 42% radiology,

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NDM-1 Environment

- Walsh 2011- New Delhi
- 12 of 171 seepage samples grew
- 2 of 50 water samples grew
- 11 species in which NDM-1 not previously reported
- Some resistance to meropenem seen in isolates

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Survival - CRE

- Havill 2014
- Looked at *K. pneumoniae* and *C. freundii*

	Water	TSB
K. pneumoniae	19 days	40 days
C. freundii	12 days	40 days

- Can be shed into the environment and survive
- Because in GI tract, could be shed with high inoculum

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Clostridium difficile

- Fekety 1980
  - Hands and fecally contaminated items
  - Low infective dose in hamsters in presence of antibiotics
  - Over 1000 cfu orally did not colonize nor infect unchallenged hamsters
  - Looked at relationship with Lactobacilli and other gut flora

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C. difficile

- Deep cleaning
  - "…breaking the cycle of faecal-oral spread."
  - Included deep cleaning (emptying ward) (Cartmill 1994)
- Floor Contamination
  - Especially washrooms, sluice rooms
  - Moved by feet hypothesized
  - High rate of colonization in Geriatrics (McCoubrey 2003)

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C. difficile Colonization

- Alasmari 2014 14% on admission
  - Toxigenic, no relation to previous admission
- Galdys 2014 Review article
  - Strong evidence suggests that CD-colonized individuals are a reservoir for CD infection
- Donskey 2014 Review article
  - As above.
  - Sporicidal in all rooms potential to reduce transmission

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MRSA diarrhea

- Stools for CD testing cultured for MRSA
  - Diarrhea and MRSA colonization of stool (Case)
  - MRSA + patients, negative stool (Control)
- 10 surfaces in patient's room
- 59% of case surfaces contaminated
- 23% of control surfaces contaminated
  - Boyce 2007

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Ebola

- 2-4 litres of liquid stool per day
  - Lyon 2014

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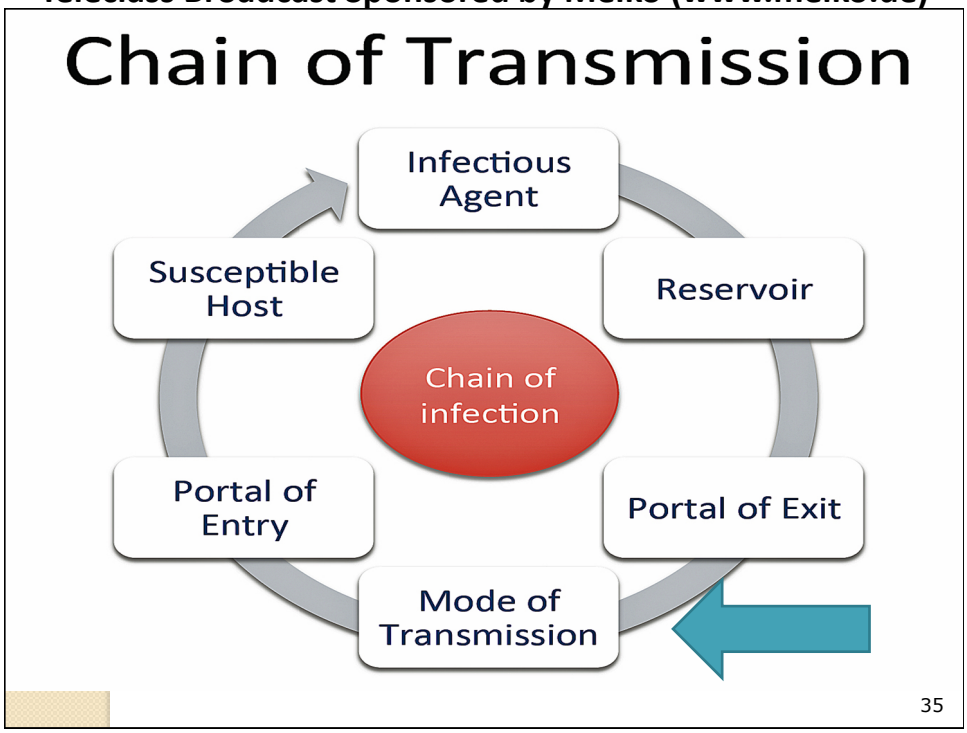
Chain of Transmission
Infectious Agent
Reservoir
Portal of Exit
Mode of Transmission
Portal of Entry
Susceptible Host
Chain of infection
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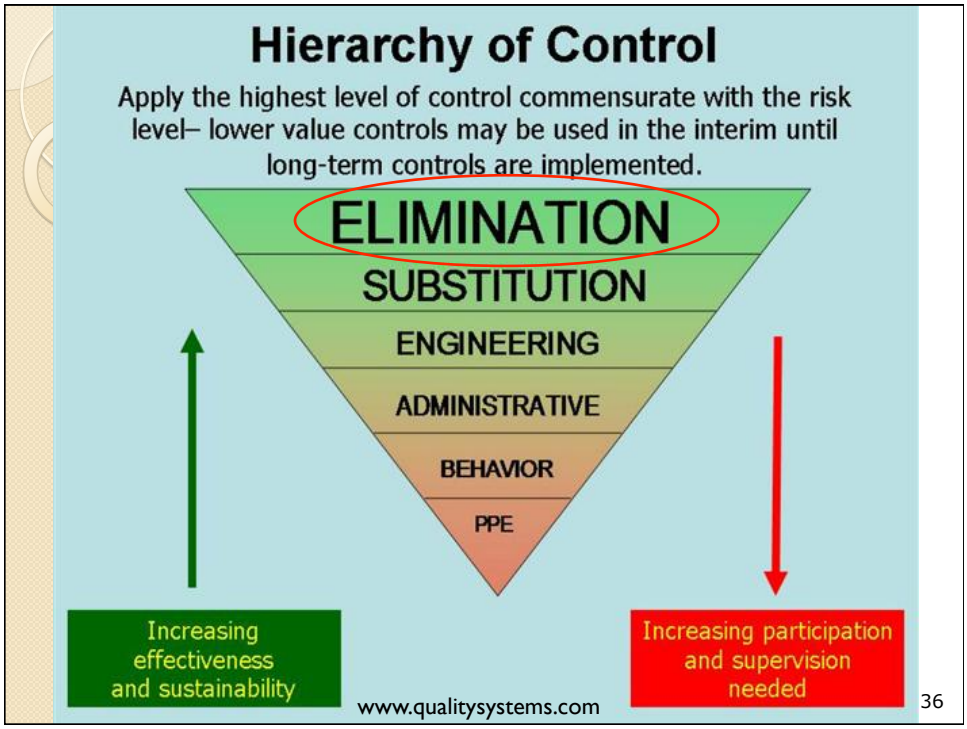
Hierarchy of Control
Apply the highest level of control commensurate with the risk level– lower value controls may be used in the interim until long-term controls are implemented.
ELIMINATION
SUBSTITUTION
ENGINEERING
ADMINISTRATIVE
BEHAVIOR
PPE
Increasing effectiveness and sustainability
Increasing participation and supervision needed
www.qualitysystems.com
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Patient Hand Hygiene

- Savage 2011
- 36 hour observation session
- Patients: 151 opportunities
  - Zero used soap or ABHR
- Visitors: 121 opportunities
  - 4% soap or ABHR

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Journal of Hospital Infection 75 (2010) 269–272

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

ELSEVIER

Systematic patients' hand disinfection: impact on meticillin-resistant *Staphylococcus aureus* infection rates in a community hospital

D. Gagné, G. Bédard, P.J. Maziade*

Centre Hospitalier Pierre Legardeur, Terrebonne, Québec, Canada

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Does it Work?

- Could not get rates down
- 4 full time and 4 part time attendants hired
- Met patients and visiting relatives at door
- Verbal and pamphlet
- Encourage to clean hands at least twice per day
- Used 70% with 0.5% Chlorhexidine

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Results Impressive

	2002-3	2003-4	Reduction
MRSA Infections per 1000 Admissions	10.6	5.2	51%
MRSA BSI	1.3	0.2	85%
MRSA Resp	4.9	1.5	69%
Ratio MRSA BSI / MSSA BSI	59% (13/22)	14% (2/14)	76%
MRSA Mortality	0.7	0.2	71%

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Projected Savings

- $688,843!
- May have prevented 51 infections
  - MRSA infection ~ $14,360
  - MRSA BSI ~ $27,083
  - Staffing was $170,000

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MRSA Infections per 1000 Patient Admissions

04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13
2.3	1.0	0.6	0.6	0.7	0.5	0.3	0.2	0

Personal Communication 2013

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Hand Sanitizer Bottle Label

FOR PATIENT USE
Keep on overbed table
If necessary, please ask for assistance to use this product

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Help Wanted

With Hand Hygiene!

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Patient Moments

Landers 2012 (review)

1. After using the toilet, bedpan, or commode
2. When returning to room after test or procedure
3. Before eating, drinking, taking medicine, or putting anything in your mouth

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Patient Moments

4. When visibly dirty
5. Before touching any breaks in the skin (wounds, dressing, tubes) or any care procedure (dialysis, IV drug administration, injections)
6. Before dialysis, contact with IV lines or other tubes

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Patient Moments

7. After coughing, sneezing, or touching nose or mouth
8. Before interacting with visitors and after they leave
9. When there is concern about whether hand are clean

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Jim's Additional Moments

1. Leaving a wheelchair
   - New pamphlet for patients
2. After pet therapy (Lefebvre 2006)

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C. difficile

- APIC 2013 – Guide to preventing CDI
- Patient hand hygiene is mentioned
- Single use bedpan or single patient bedpan
  - "Disposal of excreta and cleaning of the bedpan or commode should be preplanned"
  - "An alternate is to use a single patient–use bedpan that can be cleaned with a bleach-based disinfectant after each use"

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Preventative Measures

- Palmore 2013 - CRE
- Patients use gloves and gowns
- Double clean
- Hand hygiene (staff)
- Chlorhexidine baths (ICU)
- Adherence monitoring

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Preventative Measures

- Bed cleaning
- Sink drains
- Room vapor disinfection

- No mention of patient hand hygiene

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Guidelines

ECDC TECHNICAL REPORT

Risk assessment on the spread of carbapenemase-producing Enterobacteriaceae (CPE)

through patient transfer between healthcare facilities, with special emphasis on cross-border transfer

ECDC
2011

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European Center for Disease Control

- Prior antimicrobial use
- Length of stay (time at risk)
- Severity of illness
- Mechanical ventilation
- Admission to the ICU
- High procedure score
- Presence of wounds
- Positive culture from a blood isolate
- Transfer between hospital units within the same hospital
- Prior surgery
- Prior hospital stay
- Presence of a biliary catheter and recent transplantation

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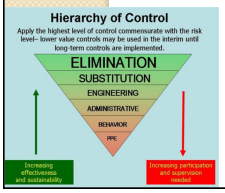
ECDC – Low Grade Evidence

- …consistently supports the effectiveness of early, active surveillance for CPE carriage by rectal screening
- Additional precautions for the care of CPE-positive patients,
  - wearing disposable gloves and gown
  - cohort nursing by a separate, dedicated team



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ECDC – Other Measures

- Long Term Healthcare Facilities
  - Israel uses contact precautions if:
    - Patient incontinent
    - On antimicrobials

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Public Health England

Acute trust toolkit for the early detection, management and control of carbapenemase-producing Enterobacteriaceae

2013

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Public Health England

1.5 Countries and regions with reported high prevalence of healthcare-associated carbapenemase-producing Enterobacteriaceae[5]

Bangladesh	North Africa (all)
The Balkans	Malta
China	Middle East (all)
Cyprus	Pakistan
Greece	South East Asia
India	South/Central America
Ireland	Turkey
Israel	Taiwan
Italy	USA
Japan	

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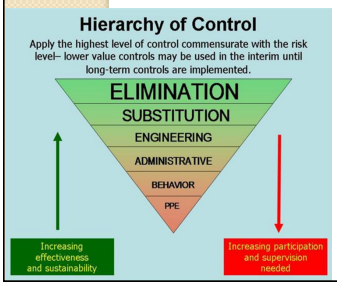
PHE

- Early Screening
- Early Isolation
- Reinforce Strict Standard Precautions



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PHE

- No words such as
  - Bedpan
- Does have language for
  - Diarrhoea (around hand hygiene)
  - Toilet (that patient will have a private en suite)
  - Environment (cleaning)
  - Commode (if no toilet)
  - Disinfection (high touch, mattresses, endoscope, etc.)

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PHE

- Other close-patient contact equipment and items
  - pulse oximeters, blood pressure cuffs, stethoscopes and thermometers, privacy curtains, unused wrapped single-use items in the patient's immediate vicinity, tubes of ointment and lubricant

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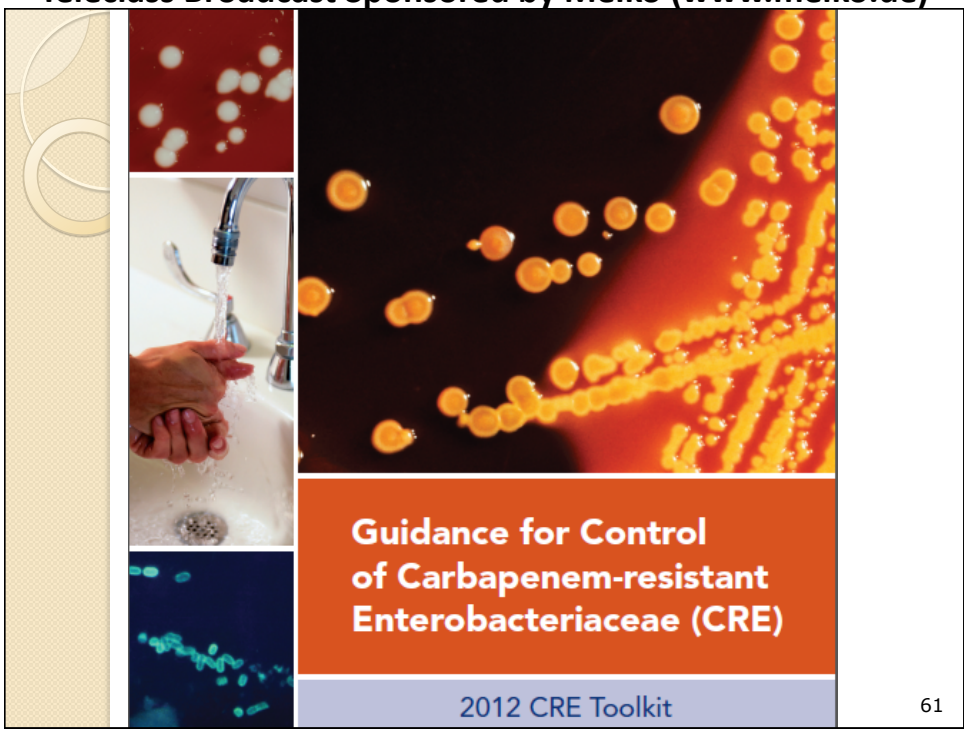
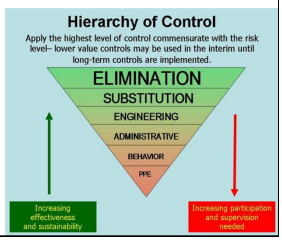


CDC

- Hand Hygiene
- Contact Precautions (colonized or infected)
- Patient and staff cohorting
- Minimize use of invasive devices
- Antimicrobial Stewardship
- Screening



CDC

- LTC settings high risk residents
  - totally dependent upon healthcare personnel for activities of daily living
  - ventilator-dependent
  - incontinent of stool
  - wounds whose drainage is difficult to control
  - high-risk settings (e.g., ventilator unit)

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CDC

- No words such as
  - Diarrhea, Toilet, Environment, Bedpan, Commode, Disinfect, patient hand hygiene
- Does recognize that incontinent patients in LTC should have
  - Private room
  - Possibly chlorhexidine bathing

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Home > Consumers > Monthly alerts for consumers

CRE: The 'nightmare bacteria'

A A A 13

We expect antibiotics to work for every infection, but they don't . . . anymore

3/20/2013

CRE (carbapenem-resistant Enterobacteriaceae) infections come from bacteria that are normally found in a healthy person's digestive tract. When a person is receiving serious medical care (for example, involving urinary catheters, intravenous catheters, or surgery) these bacteria can end up where they don't belong—for example in the bladder or blood. Because these bacteria have become resistant to antibiotics, these infections are very difficult to treat.

http://www.apic.org/For-Consumers/Monthly-alerts-for-consumers/Article?id=cre-the-nightmare-bacteria 65

Spread of CRE infection

- To get a CRE infection, a person must be exposed to CRE bacteria.
- CRE bacteria are most often spread person-to-person in healthcare settings specifically through contact with:
  - infected or colonized people
  - contact with wounds or stool

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What You Can Do Now

8. When you are in a healthcare facility, insist that **everyone** who takes care of you clean their hands with soap and water or an alcohol-based hand rub before touching you! And remind them to wash their hands again as they leave your room!

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CRE Guidelines

- Curran 2014
- Confusion on terms like Standard Precautions
- Ensure guidelines writers understand the front line

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Curran 2014

- 5 Fronts:
  - SP for all and additional transmission based precautions for CRE
  - Hand washing basins free of CRE
  - Safe injection and endoscopy practices
  - Prepare for outbreaks
  - Antimicrobial stewardship

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So, What do I Suggest?

- Monitor, or know, how many patients are incontinent
  - Or using briefs, diapers, assistive devices
- Cochard 2014 – ESBL carriage nursing homes
- Significantly associated with
  - Malignancy
  - Urinary AND fecal incontinence

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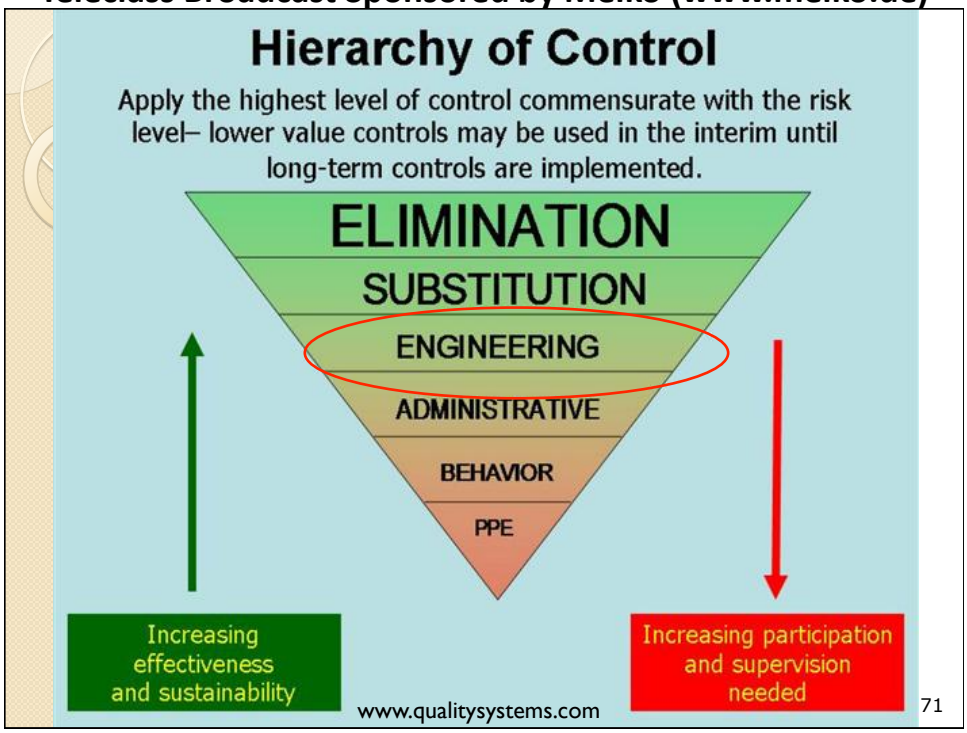

Suggestions

- Manage feces and urine better than our great grandfathers
- Mandate NO manual cleaning
  - Thermal disinfection
  - Macerators
  - Liners
  - Disposable

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Suggestions

- When we publish, list how feces and urine is managed and by what percentage
  - Brief
  - Toilet
  - Commode
  - Thermal disinfection
  - Macerator
  - Liner

73

Suggestion

- Mandatory gown use for any contact or potential contact with feces
  - All the time
  - Horizontal program
- Sporicidal agent for all terminal cleans of washrooms (Bengualid 2011, Galdys 2014)

74

Suggestions

- Isolate patients with diarrhea
  - Benjamin 2014
- Any soiling of the environment with feces is an issue!

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Suggestions – Clean!

- Nseir 2011
  - Acquisition if in bed from previous patient
- Siani 2011
  - Wipes moved spores around
  - Issue with "sporicidal" claims
- Sattar 2013
  - Need better control of wipe use and testing
- Loo 2015
  - Clean environment and patient's hands

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Suggestions – Clean!

- Zoutman 2013
  - 40% of ICP's felt hospital was NOT clean enough
  - Frequent consultation between IPAC and Environmental Services before cleaning changes – lower CDI rates

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Suggestions – Clean!

- Zoutman 2014
- Less than 50% of ES managers felt they had enough staff
- Over 1/3 did no auditing

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Suggestions

- Lids on toilets/hoppers
  - Aerosols around toilets from flushing has been studied (Gerba 1975, Barker 2005, Johnson 2013)
  - C. difficile was in droplets around toilets with no lids (Best 2012, Roberts 2008)
  - Viral spread (Verani 2014)

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Ebola

- Feces and vomit have virus
  - (Shieffelin 2014, Chertow 2014)
  - Dallas family
    - No illness
  - Dallas hospital
    - 2 infected
- Wet Phase
  - 2-4 litres of liquid stool per day

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WARNING!!

This patient has:

Skin!

Feces!

Mucous Membranes!

PERFORM HAND HYGIENE AFTER CONTACT WITH THIS PATIENT OR THEIR ENVIRONMENT!

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Comments? Questions?

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