Prevention of infectious disease through limiting overuse of devices

Prof. Stephan Harbarth
Infection Control Programme
University of Geneva Hospitals
Disclosures & acknowledgments

- **Advisory board honoraria**: GSK, Abbott, Janssen, Bayer, DNA Electronics

- **Research funding**: B.Braun, Pfizer, IMI, European Commission

- **Slides**: A./B. Huttner & W. Zingg
Topics

- General introduction
- Catheter-associated UTI
- Catheter-related BSI
- Mechanical ventilation and VAP
HCWs’ mobile phones

- **MRSA:**
  52%+ mobile phones
  38%+ HCW hands

- **ESBL:**
  38%+ mobile phones
  40%+ HCW hands

- **Cleanliness:**
  90% of HCWs never cleaned their phone!

(Courtesy of A. Voss)
Ils sont PARTOUT ces microbes
Swiss *NI* Prevalence Study

**Multivariate analysis**

Independent variables only [OR; CI<sub>95</sub>]

Variables introduced into the multivariate analysis:

- Hospital size
- Sex
- Age
- Charlson
- McCabe
- Admission mode
- Ward location
- Admission diagnosis
- Prior surgery
- Neutropenia
- Antacid exposure
- Antibiotic exposure
- CVC exposure
- Urinary catheter exposure
- Prior intubation
- Prior LOS

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*Sax H et al. Arch Intern Med 2002*
Device-associated infection density

Expressed as number of infections per 1000 device-days

<table>
<thead>
<tr>
<th></th>
<th>INICC 2004-2009, pooled mean (95% CI)</th>
<th>US NHSN 2006-2008, pooled mean (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medical cardiac ICU</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLABSI</td>
<td>6.2 (5.6-6.9)</td>
<td>2.0 (1.8-2.1)</td>
</tr>
<tr>
<td>CAUTI</td>
<td>3.7 (3.2-4.3)</td>
<td>4.8 (4.6-5.1)</td>
</tr>
<tr>
<td>VAP</td>
<td>10.8 (9.5-12.3)</td>
<td>2.1 (1.9-2.3)</td>
</tr>
<tr>
<td><strong>Medical-surgical ICU</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLABSI</td>
<td>6.8 (6.6-7.1)</td>
<td>1.5 (1.4-1.6)</td>
</tr>
<tr>
<td>CAUTI</td>
<td>7.1 (6.9-7.4)</td>
<td>3.1 (3.0-3.3)</td>
</tr>
<tr>
<td>VAP</td>
<td>18.4 (17.9-18.8)</td>
<td>1.9 (1.8-2.1)</td>
</tr>
<tr>
<td><strong>Pediatric ICU</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLABSI</td>
<td>10.7 (9.9-11.5)</td>
<td>3.0 (2.7-3.1)</td>
</tr>
<tr>
<td>CAUTI</td>
<td>4.7 (4.1-5.5)</td>
<td>4.2 (3.8-4.7)</td>
</tr>
<tr>
<td>VAP</td>
<td>6.5 (5.9-7.1)</td>
<td>1.8 (1.6-2.1)</td>
</tr>
<tr>
<td><strong>Newborn ICU (1,501-2,500 g)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLABSI</td>
<td>11.9 (10.2-13.9)</td>
<td>1.5 (1.2-1.9)</td>
</tr>
<tr>
<td>VAP</td>
<td>10.1 (7.9-12.8)</td>
<td>0.8 (0.04-1.5)</td>
</tr>
</tbody>
</table>
Device overuse ➔ MDRO infection

• Indwelling devices facilitate development of biofilms and adherence of MDROs

• Recent NDM outbreak in South Africa:
  – Each additional day of mechanical ventilation associated with 1.3x↑ odds of NDM infection

• Recent KPC outbreak in Australia:
  – CVC exposure: 13x↑ odds of KPC acquisition

Cronin et al. J Hosp Infect 2017; De Jager et al. PLOS One 2015
Topics

• General introduction
• Catheter-associated UTI
Healthcare-Associated Urinary Tract Infection

- Urinary tract infection (UTI) causes ~40% of hospital-acquired infections
- Most infections due to urinary catheters
- 10-25% of inpatients are catheterized
Catheter-associated bacteriuria

- Risk #1 for bacteriuria: the catheter
  - Daily incidence is 3%-8%
  - After 1 month, risk = 100%

- Risk #1 for UTI: bacteriuria
  - 10 – 25% of patients with bacteriuria will develop UTI

Duration of postoperative urinary catheter use and risk of UTI


Retrospective cohort study
USA 2001
2965 hospitals
35 904 patients

86% perioperative catheter
50% of these > 2 days
Beyond Infection: Device Utilization Ratio as a Performance Measure for Urinary Catheter Harm

Mohamad G. Fakih, MD, MPH;¹,² Carolyn V. Gould, MD, MSCR;³ Barbara W. Trautner, MD, PhD;⁴,⁵ Jennifer Meddings, MD, MSc;⁶ Russell N. Olmsted, MPH, CIC;⁷ Sarah L. Krein, RN, PhD;⁸ Sanjay Saint, MD, MPH⁹

• **Key concept:** To advocate use of the device utilization ratio (DUR) as an additional performance measure for potential urinary catheter overuse and harm

Analysis: Device Utilization (DU) Ratio

Urinary Catheter DU Ratio = \# Indwelling catheter days \# Patient Days

DU Ratio measures the proportion of total patient-days in which indwelling urinary catheters were used.

Indwelling catheter use is necessary for CAUTI. Therefore reducing your facility/location’s catheter device utilization rate, may lead to reduced CAUTI rates.
### Urinary Catheter Utilization Ratios, NHSN, 2012

<table>
<thead>
<tr>
<th>Type of location</th>
<th>No. of locations</th>
<th>Catheter days</th>
<th>Patient days</th>
<th>Pooled DU Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CRITICAL CARE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical-Major teaching</td>
<td>230</td>
<td>741,268</td>
<td>1,061,826</td>
<td>0.70</td>
</tr>
<tr>
<td>Medical-All others</td>
<td>460</td>
<td>852,627</td>
<td>1,401,026</td>
<td>0.61</td>
</tr>
<tr>
<td>Medical cardiac</td>
<td>405</td>
<td>703,734</td>
<td>1,393,767</td>
<td>0.50</td>
</tr>
<tr>
<td>Medical/surgical – major teaching</td>
<td>328</td>
<td>935,001</td>
<td>1,371,681</td>
<td>0.68</td>
</tr>
<tr>
<td>Neurosurgical</td>
<td>173</td>
<td>489,391</td>
<td>713,836</td>
<td>0.69</td>
</tr>
<tr>
<td>Pediatric medical/surgical</td>
<td>297</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical – major teaching</td>
<td>176</td>
<td>558,102</td>
<td>745,658</td>
<td>0.75</td>
</tr>
<tr>
<td>Surgical – cardiothoracic</td>
<td>456</td>
<td>939,044</td>
<td>1,417,609</td>
<td>0.66</td>
</tr>
<tr>
<td><strong>INPATIENT WARDS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical</td>
<td>813</td>
<td>882,392</td>
<td>5,552,794</td>
<td>0.16</td>
</tr>
<tr>
<td>Medical/surgical</td>
<td>1825</td>
<td>2,038,073</td>
<td>11,501,523</td>
<td>0.18</td>
</tr>
<tr>
<td>Neurosurgical</td>
<td>48</td>
<td>61,879</td>
<td>315,157</td>
<td>0.20</td>
</tr>
<tr>
<td>Surgical</td>
<td>458</td>
<td>647,041</td>
<td>2,887,968</td>
<td>0.22</td>
</tr>
</tbody>
</table>

Do you know those numbers for your own institution?

Urinary Catheter Utilization by Geographic Region

<table>
<thead>
<tr>
<th>Region</th>
<th>CAUTIs</th>
<th>Device-days</th>
<th>Patient-days</th>
<th>Catheter utilization ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>56</td>
<td>23,885</td>
<td>38,740</td>
<td>0.617</td>
</tr>
<tr>
<td>Midwest</td>
<td>106</td>
<td>49,800</td>
<td>80,736</td>
<td>0.617</td>
</tr>
<tr>
<td>West</td>
<td>124</td>
<td>45,565</td>
<td>75,383</td>
<td>0.612</td>
</tr>
<tr>
<td>Total</td>
<td>566</td>
<td>230,255</td>
<td>380,066</td>
<td>0.606</td>
</tr>
<tr>
<td>Non-ICU</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>77</td>
<td>22,112</td>
<td>126,391</td>
<td>0.175</td>
</tr>
<tr>
<td>Midwest</td>
<td>137</td>
<td>59,028</td>
<td>301,531</td>
<td>0.196</td>
</tr>
<tr>
<td>South</td>
<td>176</td>
<td>72,431</td>
<td>383,359</td>
<td>0.189</td>
</tr>
<tr>
<td>West</td>
<td>143</td>
<td>50,381</td>
<td>209,423</td>
<td>0.241</td>
</tr>
<tr>
<td>Total</td>
<td>533</td>
<td>203,952</td>
<td>1,020,704</td>
<td>0.200</td>
</tr>
</tbody>
</table>

Unclear: what are the maximum DURs that are still acceptable?
Indications for the use of indwelling urethral catheters

- **Indications**
  - Perioperative use for selected surgical procedures
  - Urine output monitoring in critically ill patients
  - Management of acute urinary retention and urinary obstruction
  - Assistance in pressure ulcer healing for incontinent residents
  - **As an exception**, at patient request to improve comfort

- Urinary incontinence is **not** an accepted indication for urinary catheterization
  - 21 to 50 percent of urinary catheters not indicated

# Infection Prevention Program Characteristics and Catheter Use Policies

<table>
<thead>
<tr>
<th>Program Characteristic</th>
<th>All Respondents (N=353), No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead infection preventionist has ≥3 years of infection prevention experience</td>
<td>259 (73.4)</td>
</tr>
<tr>
<td>Hours per week spent on infection prevention-related activities, mean (± SD)</td>
<td>14.4 (±12.6)</td>
</tr>
<tr>
<td>Nursing home committee reviews healthcare-associated infections, including CAUTI</td>
<td>285 (80.7)</td>
</tr>
<tr>
<td>Nursing home has a policy regarding:</td>
<td></td>
</tr>
<tr>
<td>Appropriate indications for catheter use</td>
<td>279 (79.0)</td>
</tr>
<tr>
<td>Urinary catheter insertion</td>
<td>328 (92.9)</td>
</tr>
<tr>
<td>Urinary catheter maintenance</td>
<td>321 (90.0)</td>
</tr>
<tr>
<td>Requires a physician order for catheter placement with documentation of indication</td>
<td>325 (92.1)</td>
</tr>
</tbody>
</table>
Are physicians aware of which of their patients have indwelling urinary catheters?

<table>
<thead>
<tr>
<th>All providers</th>
<th>Provider unaware of catheter [n (%)]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>88 / 319 (28%)</td>
</tr>
</tbody>
</table>

Are physicians aware of which of their patients have indwelling urinary catheters?

Many of them don’t seem to be aware... so remind them!

<table>
<thead>
<tr>
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<th>Provider unaware of catheter [n (%)]</th>
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</thead>
<tbody>
<tr>
<td>All providers</td>
<td>88 / 319 (28%)</td>
</tr>
<tr>
<td>Medical students</td>
<td>8 / 39 (21%)</td>
</tr>
<tr>
<td>Interns</td>
<td>19 / 88 (22%)</td>
</tr>
<tr>
<td>Residents</td>
<td>28 / 104 (27%)</td>
</tr>
<tr>
<td>Attending physicians</td>
<td>33 / 88 (38%)</td>
</tr>
</tbody>
</table>

Sustained reductions in urinary catheter use over 5 years: Bedside nurses view themselves responsible for evaluation of catheter necessity

Mohamad G. Fakih MD, MPH\textsuperscript{a,b,*}, Janice E. Rey MT\textsuperscript{b}, Margarita E. Pena MD\textsuperscript{c}, Susanna Szpunar DrPH\textsuperscript{d}, Louis D. Saravolatz MD\textsuperscript{a}
Prevention of Catheter-Associated Urinary Tract Infection (CA-UTI)

Two main principles

Avoid unnecessary catheterization

Limit the duration of catheterization
Early Removal of Indwelling Catheters: Summary of the Evidence

• 14 studies have evaluated urinary catheter reminders and stop-orders (written, computerized, nurse-initiated)
  – Significant reduction in catheter use
  – Significant reduction in infection
  – No evidence of harm (ie, re-insertion)
Limiting unnecessary urinary catheter use is challenging... but successful!

Preventing Catheter-Associated Urinary Tract Infection in the United States
A National Comparative Study
Sanjay Saint, MD, MPH; M. Todd Greene, PhD, MPH; Christine P. Kowalski, MPH; Sam R. Watson, MSA, MT; Timothy P. Hofer, MD, MSc; Sarah L. Krein, PhD, RN

Barriers to Reducing Urinary Catheter Use
A Qualitative Assessment of a Statewide Initiative
Sarah L. Krein, PhD, RN; Christine P. Kowalski, MPH; Molly Harrod, PhD; Jane Forman, ScD, MHS; Sanjay Saint, MD, MPH

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Catheter Out Program

Welcome
Urinary tract infection represents at least 20% of all healthcare associated infections, with the vast majority due to the indwelling urinary catheter. Over 1,000,000 patients develop a catheter associated urinary tract infection (CAUTI) in a U.S. hospital each year. Most hospital staff realize that the use of urinary catheters – the dominant risk factor for healthcare associated UTI – should be minimized for many important reasons: the risk of the infection to the patient, the risk of further complications such as urea, anticoagulants, patient immobility and discomfort, and even reimbursement due to the Centers for Medicare and Medicaid ruled changes. However, achieving a reduction in indwelling Foley catheter use can be challenging and the best way to do that can and does vary from not only hospital to hospital, but potentially from unit to unit as well.

This website gives you an array of options for reducing CAUTI and indwelling urinary catheter use. Some options can include tools for physician and nurse engagement, ideas for nurse led ‘catheter patrols’ to access patients for Foley’s and initiate removal for those that are non-indicated, Foley stop orders, and brochures for patients and their families that are requesting a Foley without a true medical indication.

We hope you find our site useful. Please feel free to contact us and provide feedback!

Available at: http://catheterout.org/?q=banner
**Urinary Catheter Reminder**

**DATE: __/__/__**

This patient has had an indwelling urethral catheter since __/__/__.

Please indicate below **EITHER (1)** that the catheter should be removed **OR (2)** that the catheter should be retained. If the catheter should be retained, please state **ALL** of the reasons that apply.

☐ Please _discontinue_ indwelling urethral catheter; **OR**

☐ Please _continue_ indwelling urethral catheter because patient requires indwelling catheterization for the following reasons (please check _all_ that apply):

☐ Urinary retention

☐ Very close monitoring of urine output and patient unable to use urinal or bedpan

☐ Open wound in sacral or perineal area and patient has urinary incontinence

☐ Patient too ill or fatigued to use any other type or urinary collection strategy

☐ Patient had recent surgery

☐ Management of urinary incontinence on patient’s request

☐ Other—please specify

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**Effect of daily reminders to physicians**

- Time-sequence nonrandomized intervention study
- Adult ICUs
- Tertiary-care university medical center Taiwan

<table>
<thead>
<tr>
<th>Average Duration of Catheterization (days)</th>
<th>Rate of CAUTI / 1000 catheter-days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Observation</td>
</tr>
<tr>
<td>7.0 (+/- 1.1)</td>
<td>11.5 (+/-3.1)</td>
</tr>
</tbody>
</table>

Effect of daily reminders to physicians

- Time-sequence nonrandomized intervention study
- Adult ICUs
- Tertiary-care university medical center Taiwan

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<th>Rate of CAUTI / 1000 catheter-days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Observation</strong></td>
<td><strong>Intervention</strong></td>
</tr>
<tr>
<td>7.0 (+/- 1.1)</td>
<td>4.6 (+/- 0.7)</td>
</tr>
</tbody>
</table>

Incidence of UTI, before and after a bundle intervention


<table>
<thead>
<tr>
<th>UTI</th>
<th>Pre-intervention period (n=280)</th>
<th>Post-intervention period (n=259)</th>
<th>RR (95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>ID*</td>
<td>N</td>
</tr>
<tr>
<td>Overall</td>
<td>35</td>
<td>27.0</td>
<td>13</td>
</tr>
<tr>
<td>Orthopedic surgery</td>
<td>29</td>
<td>45.8</td>
<td>10</td>
</tr>
<tr>
<td>Digestive surgery</td>
<td>6</td>
<td>9.0</td>
<td>3</td>
</tr>
</tbody>
</table>

* ID: episodes per 1000 catheter-days
Stéphan F. et al D, Reduction of UTI and antibiotic use after surgery: a controlled, prospective, before-after intervention study
Clin Infect Diseases 2006, 42:1544

• Incidence density of UTI decreased by 60% after orthopedic surgery following a multimodal intervention
• Decreased UTI-related antibiotic consumption
• Results were maintained after 2 years
• Less indwelling urinary catheters placed in the operating room

Early removal was key!
A Program to Prevent Catheter-Associated Urinary Tract Infection in Acute Care

Interventions

1. Daily assessment of necessity of urinary catheter

2. Avoiding use of urinary catheters
   – Alternative methods

3. Aseptic technique during insertion
   – & proper maintenance after insertion

• Further recommended interventions
  – Feedback of CAUTI rates
  – Education
Implementation

• Provision of tools, manuals, and checklists
• Detailed implementation guide
• In-person meetings, coaching calls, and webinars

• Primary outcome: CAUTI rate/1000 catheter days
Appendix M. Urinary Catheter Decision-Making Algorithm

Is there a urinary catheter in place?
- **NO**
  - Avoid catheter placement.

Does the patient meet criteria for catheter placement?
- **YES**
  - Contact physician to obtain order to remove urinary catheter!
- **NO**
  - Assess patient daily for possibility of catheter removal.

Accepted Urinary Catheter Placement Indications:
1. Acute urinary retention or obstruction
2. Perioperative use in selected surgeries
3. Assistance in healing of severe perineal and sacral wounds in incontinent patients
4. Hospice/comfort care/palliative care
5. Required strict immobilization for trauma or surgery
6. Accurate measurement of urinary output in critically ill patients (intensive care)

REMOVE IT!

Urinary Catheters Increase...

- Patient Discomfort
- Antibiotic Use
- Cost
- Length of Stay
- Likelihood of Infection

...and patients with urinary catheters tend to stay in bed, increasing risk of skin breakdown, deep-vein thrombosis, weakness, and delirium.

Catheters Are NOT Indicated for...
- Routine urinary output monitoring outside the ICU
- Incontinence
- Prolonged postoperative use
- Morbid obesity
- Immobility
- Confusion or dementia
- Patient request

Catheters Are INDICATED for...
- Acute urinary retention or obstruction
- Perioperative use in selected surgeries
- Assistance in healing of severe perineal and sacral wounds in incontinent patients
- Hospice, comfort care, or palliative care
- Required strict immobilization for trauma or surgery
- Accurate measurement of urinary output in critically ill patients (intensive care)
Outcome

Decrease in catheter use from **20.1% to 18.8%** (non-ICUs)
- incidence rate ratio, 0.93; 95% CI, 0.90 to 0.96; P<0.001

Decrease in CAUTI rates (non-ICU) from **2.28 to 1.54 infections** per 1000 cath-days
- incidence rate ratio, 0.68; 95% CI, 0.56 to 0.82; P<0.001

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non-ICU (N = 553)</th>
<th>ICU (N = 373)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IRR (95% CI)</td>
<td>P Value</td>
</tr>
<tr>
<td>Time†‡</td>
<td>0.68 (0.56–0.82)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Teaching hospital</td>
<td>1.76 (1.03–3.01)</td>
<td>0.04</td>
</tr>
<tr>
<td>Rural hospital</td>
<td>0.90 (0.66–1.23)</td>
<td>0.51</td>
</tr>
<tr>
<td>Critical-access hospital</td>
<td>2.36 (1.65–3.37)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hospital size (per 100-bed increase)‡</td>
<td>0.97 (0.90–1.05)</td>
<td>0.45</td>
</tr>
</tbody>
</table>

*Table 3. Multivariable-Regression Estimates of Changes in Catheter-Associated UTI Rates, According to Unit Type.*
Silver alloy-coated catheters were not effective for reduction of incidence of symptomatic CAUTI.

Reduction in CAUTI associated with nitrofural-impregnated catheters less than that regarded as clinically important.

Routine short term use of antimicrobial-impregnated catheters not recommended.
Risk for CRBSI

Catheter-related bloodstream infections

Central venous catheter (CVC)
2.7/1000 catheter-days

Peripherally inserted central catheter (PICC)
2.1/1000 catheter-days

Tunneled CVCs
1.6/1000 catheter-days

Peripheral catheters
0.5/1000 catheter-days

Implantable port systems
0.1/1000 catheter-days
CLABSI and catheterization time

Proportion of infected pts (%) vs. Catheter days

Sitges-Serra A, J Clin Micro 1988
**Frequency of CVC handling and risk of CLABSI**

<table>
<thead>
<tr>
<th></th>
<th>Risk*</th>
<th>CI$_{95}$*</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV-infected patients (n=168)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacterial infection within prior month</td>
<td>2.1</td>
<td>1.1-3.8</td>
<td>.02</td>
</tr>
<tr>
<td>Neutropenia</td>
<td>1.8</td>
<td>1.1-3.15</td>
<td>.02</td>
</tr>
<tr>
<td><strong>Frequency of long-term CVC handling†</strong></td>
<td><strong>1.15</strong></td>
<td><strong>1.03-1.3</strong></td>
<td><strong>.009</strong></td>
</tr>
<tr>
<td>Cancer patients (n=213)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacterial infection within prior month</td>
<td>5.4</td>
<td>1.2-25.3</td>
<td>.01</td>
</tr>
<tr>
<td>Karnofsky performance status &gt;80%</td>
<td>5.3</td>
<td>1.5-19.3</td>
<td>.002</td>
</tr>
<tr>
<td>Metastatic extension</td>
<td>4.1</td>
<td>0.9-19.5</td>
<td>.05</td>
</tr>
</tbody>
</table>
(Over-)use of central venous lines

Types of „indications“

ICU; median dwell-time: 4 (2-7)

Non-ICU; median dwell-time: 8 (3-14)
Unjustified CVC use

- Hospital-wide cross-sectional survey
- 320 patients, 74 CVCs, 62 (19%) Pts (46 ICU, 28 non ICU)
Bundle components to reduce catheter-associated bloodstream infections:

- Hand hygiene
- Maximal sterile barrier precaution at insertion
- Skin antisepsis with alcohol-based chlorhexidine-containing products
- Subclavian access as the preferred insertion site
- Standardized catheter care using a non-touch technique
- Respecting the recommendations for dressing change
- **Daily review of line necessity**

Eggimann P. Lancet 2000; 35: 290
## Efficacy of multimodal intervention strategies:

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Intervention</th>
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<tbody>
<tr>
<td><strong>Eggimann</strong></td>
<td>3.1/1000 catheter-days</td>
<td>1.2/1000 catheter-days</td>
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<tr>
<td><em>Lancet</em> 2000</td>
<td></td>
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<td><em>Ann Intern Med</em> 2005</td>
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<td><strong>Pronovost</strong></td>
<td><em>7.7/1000 catheter-days</em></td>
<td><em>1.4/1000 catheter-days</em></td>
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<td><em>NEJM</em> 2006</td>
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<td><strong>Zingg</strong></td>
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<td><em>Crit Care Med</em> 2009</td>
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</table>

*mean pooled CRBSI-episodes per 1’000 catheter-days

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Eggimann P. *Lancet* 2000; 35: 290
Zingg W. *Crit Care Med* 2009; 37: 2167

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Topics

• General introduction
• Catheter-associated UTI
• Catheter-related BSI
• Mechanical ventilation and VAP
Ventilator-associated pneumonia (VAP)

- Most common infection in the ICU
- Affects approx. 15% of ventilated patients
- Daily hazard peak: day 5
The basic rules of VAP prevention

• Do not intubate, unless necessary

• Extubate, as soon as possible
<table>
<thead>
<tr>
<th>Author/Society</th>
<th>Invasive Device removal</th>
<th>Avoid Endotracheal Intubation</th>
<th>Avoid Reintubation</th>
<th>Promote NIV if possible</th>
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<td>European HAP Working Group/European Respiratory Society/ESCMID</td>
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<td>The Spanish Society of Pulmonology and Thoracic Surgery</td>
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<td>Singapore Infection Control Association and Singapore Society of Intensive Care Medicine</td>
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</table>
Non-invasive ventilation in COPD

Conservative approach (MV) versus non invasive MV (NIV) in 100 episodes of respiratory failures

Girou et al. JAMA 2000
Take home messages

• Invasive devices: Less is more

• Physicians should first consider safety and not patient/nurse comfort

• Develop and implement reminders about catheter indications and removal
Urinary Cath: ABCDE

- **Adherence** to general infection control principles is important (e.g., hand hygiene, surveillance, aseptic insertion, proper maintenance, education).
- **Bladder ultrasound** may avoid indwelling catheterization.
- **Condom catheters** or other alternatives to an indwelling catheter such as intermittent catheterization should be considered in appropriate patients.
- **Do not use** the indwelling catheter unless you must!
- **Early removal** of the catheter using a reminder or nurse-initiated removal protocol appears warranted.
See you at ICPIC in Geneva!
June 20 to 23, 2017

Thank you for your attention!