Antibiotic Stewardship:
First Steps of a Necessary Culture Change

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ANTIBIOTICS
THE END OF MIRACLE DRUGS?
WARNING
NO LONGER EFFECTIVE AGAINST KILLER BUGS
Objectives

• Understand principles of antibiotic stewardship programs

• Review results of the first year of Antibiotic stewardship at MUHC

• Develop a personal approach to improve antibiotic usage

• Look up to the future in evolution of programs
How do we compare in Montreal?

Taux pour les hôpitaux de Montréal, par taille, période 6 (2004-05) à 13 (2012-13)*

RVH

MGH
Vs Teaching Hospitals in Quebec
C. difficile Plan of Action
New C. difficile Policy: 5 axis

- Isolation and Precautions
- Cleaning and disinfection
- Antibiotic stewardship
- Excretion management
- Administrative/organisational measures
• Of 246 patients with new-onset CDI, 445 antimicrobial courses.
  – 77% at least 1 unnecessary antimicrobial dose
  – 26% of patients received only unnecessary antimicrobials
  – 45% of total non-CDI antimicrobial days included unnecessary antimicrobials.

• The leading indications for unnecessary antimicrobial use were:
  – urinary tract infection
  – pneumonia.

• Conclusions. Twenty-six percent of patients with recent CDI received only unnecessary (and therefore potentially avoidable) antimicrobials
Introduction

- Antibiotic Stewardship /Surveillance
  - Mandated by Conseil du médicament 2007
  - IDSA guidelines 2007
  - Part of 12 steps Resistance prevention campaign CDC
  - Part of accreditation Canada
  - MSSS national plan of action to reduce nosocomial infections

1-Clinical Infectious Diseases ; 2007 ; 44 : 159 -77
Use Antimicrobials Wisely
Step 5: Practice antimicrobial control

Fact: Programs to improve antimicrobial use are effective.
Objective of Sterwardship

- Reduce development of resistance
- Improve quality of care
- Reduce C. difficile
- Decreased Health care cost.
- Programs have consistently shown
  - Reduction of 22-39 % AB usage
  - Net savings ( 200000-900000$)
  - AB = 20-30 % Hospital budget
Intervention Linking Stewardship to decrease resistance

Figure 2. Observed and expected incidence of methicillin-resistant *Staphylococcus aureus* (MRSA) infection before and after fluoroquinolone class restriction at Caen Hospital, France, 1998–2004. L95, lower limit of the 95% CI; U95, upper limit of the 95% CI.

Who is concerned?

- Spécialiste en infectiologie: Responsable du programme de surveillance
- Professionnel en prévention des infections
- Épidémiologiste
- Direction générale de l’établissement
- Direction des services professionnels
- Direction des soins infirmiers
- Microbiologiste
- Pharmacien
- Comité de pharmacologie
- Comité de gestion des risques

What do we need?

- Multidisciplinary group
  - Id physician
  - Pharmacist with ID training ($)
  - Infection Control professionals
  - Microbiologist
  - Hospital epidemiologist
  - Information system specialist
- Administration’s support and leadership
Two Strategies...

- Formulary restrictions and preauthorization
- Prospective audits, intervention and feedbacks
Methods, tools

- Education
  - Alone not sufficient, need active intervention
- Guidelines and clinical pathways
- Antimicrobial order form
  - Coming in Oasis
- Streamlining / deescalation
  - Reasses diagnosis
  - Adjust according to cultures
- Optimizing dose, route, duration
What do we measure?

- **Processes**: measure AB usage
  - $$$
  - DDD = defined daily dose (WHO)
  - Modified DDD = Local DDD (MUHC)
  - DOT = Days of Therapy

- **Outcomes**
  - Rates of resistance (MRSA, VRE, MDRGN)
  - C.difficile
  - % appropriate usage
Yes but Its not me ....Global

Recent studies published on overuse of ATB in ED:

• Only 30% of pneumonia treated in ER met criteria (CXR)\(^1,2\)
• Only 13% of doctors believed that they overprescribed\(^3\)

\(^1\)Welker et al. *Arch Intern Med.* 2008

\(^2\)Kanwar et al. *CHEST.* 2007

\(^3\)Abbo et al. *Infect Control.* 2011
Where do we start?
With 33 highly specialized units

- Develop guidelines MUHC
- Active AB stewardship team
  - Pharmacist available to review chart
  - Weekly revision with dedicated ID/Micro attending
  - Education and teaching to resident and staff
  - Periodic feedback on performance
- Review appropriateness of AB on all patients.
  - Prioritize units high C. difficile rates/outbreaks
- Minimize use of Quinolones
- Minimize use of PPI
MUHC guidelines
How were they developed?

1. Based on efficacy of ATB
2. Minimal side effects
3. Minimized resistance
4. Decrease risk of C. difficile infections
5. Different ATB for nosocomial vs community-acquired infections
6. Graded use of ATB (first line, second line then third line agents)
Unit/service based dedicated TEAM

- Microbiologist-ID specialists
  - Including residents
- Pharmacists dedicated
- Infection Control Practitioner
- Chief of service consulted
Method (II)

• For 1-4 weeks;
  – revision of all prescribed antibiotics (>24 heures excluding prophylaxis) ad 20-40 chartts

• Each antibiotic evaluated:
  – Indication and validity of diagnosis (MD – ICP)
  – Choice (Md-pharmacist)
  – Dose (pharmacist)
  – Duration (pharmacist)
  – Adjustment with cultures (Md et Pharm)
Method (III)

• Feedback given after initial evaluation:
  – Appropriatness / Inappropriatness
  – Indication
  – Antibiotic
  – Physician/service

• Identification of 3-4 most common issues
  – Education and targeted teaching

• Repeat evaluation shortly after and intervention in real time
  – ad performance: > 80 % appropriate

• Données qualitatives en DDD / 1000 jours-présence
Results

- Ortho-trauma : October 2011
- MNH December 2011
  - Neurologie
  - Neurochirurgie
- Cardiac Surgery Mars 2012
- Ross 3 : July 2013
- Medicine 15 : February 2012
- MGH 14 : July 2012
AB Usage at the MNH Dec 2011

Alleged treated Infections
Results (I) : MNH Dec 2011

Usage appropriate : 10/32 = 31 %

Reasons Inap:
Indication n = 12
Choice n = 15
Dose n = 6
Route n = 0
Duration n = 4
Main Problem Encountered

- Diagnosis of UTI
  - Treatment of Asx bacturia
  - U/A not done – not looked at
  - Quantification not looked at
  - No distinction pathogens/skin flora
  - Cipro given as first line
- Pneumonia with Normal CXR
- Prolong surgical prophylaxis
- Vanco 1st line for Cdiff
- Meropenem first line carbapenem ($150.00/day)
Diagnosis of UTI

Presence of:
- Urgency
- Frequency
- Suprapubic pain, tenderness
- Flank pain
- Fever and/or sepsis
- Unexplained confusion?

Urine Analysis AND Culture

- Leuco + Culture +
  - UTI likely if both are positive
- UTI unlikely

DO NOT CULTURE FOR CLOUDY URINE, FOUL SMELLING, INCONTINENCE, RETENTION,
F/U MNH april-august 2012
Appropriate = 112/177 = 63 %
ATB Stewardship MNH 2012

Appropriate versus Inappropriate use of antimicrobials per period
Dr Dal Briedis

![Graph showing appropriate and inappropriate use of antimicrobials over periods 1 to 9. The graph indicates a trend where appropriate use generally decreases, while inappropriate use increases.](image)
Ortho (MGH) : octobre 2011-novembre 2012
Andrée-anne Jean, Julie Okapuu, Valeri Blouin, Michael Libman

Evolution of antibiotic prescription

- Inappropriate
- Appropriate
Main issues identified in Ortho

• UTI:
  – Cultures initiated by nurses
• Dosage inadequate (too much or not enough)
• Duration too long
• Vanco – Tazo empirical for undocumented reasons
• No adjustments according to cultures
Ortho : august-november 2012
71/94 = 75 %
Ortho : DDD/1000 patient days
Pre 17 periods, post 18 periods administratives

PRE-INTERVENTION
POST-INTERVENTION

410 DDD/1000 jrs-presence
396 / 1000 jrs presence
Hepatobiliary- transplant
Problems identified

• A lot of prophylaxis….
• Imipenem empirically
• Ajustement with cultures not made
• Chronic C.difícile.
Hepatobiliary-transplant: DDD/1000 patient days

Pre per 4-9 2011, post per 4-9 2012

1150 DDD/ 1000 jours-présence

770 DDD / 1000 jours - présence
Cardiac Surgery
March 2011: 6/17 = 35% appropriate

- UTI
- Diagnosis and treatment of pneumonia
  - Vanco empirically for everything…
- C.difficile treatment
Cardiac Surgery : mars 2012
14/22= 64 %
ATB Stewardship S8E 2012

Appropriate versus Inappropriate use of antimicrobials per period

Dr Pierre René
Cardiac Surgery

DDD/1000 patient days

Pre per 11, 2011 - per 10, 2012, post per 11, 2012 - per 10, 2013

585 DDD/1000 jours
501 DDD/1000 Jours-présence
Conclusions

• Possible to have a targeted Antibiotic Stewardship program
  – Multidisciplinary collaboration Id/ pharmacy/Infection Control

• Need to do long term F/U
  – Periodically in context of changing residents

• Allows individualisation of guidelines specifically to each specialty

• Very favorable reception from all teams.
And now Medicine....
Antibiotic self-stewardship: 
Results of our one year odyssey

Todd C. Lee MD MPH FRCPC
Importance of inpatient stewardship

• More than 40% will receive at least one antibiotic during admission

• This may be:
  – Unnecessary
  – Excessively broad spectrum
  – Contributor to the *C. difficile* problem
  – Costly
Research hypothesis

- Well trained internal medicine residents can, with the aid of teaching and a standardized protocol, perform "self-stewardship"
- Reduce antimicrobial usage in targeted classes
- Reduce *C. difficile*
Self-Stewardship Collaborators

• Dr. Laruence Green
• Dr. Dev Jayaraman
• Dr. Charles Frenette
• Dr. Louise Pilote

• With thanks to
  – Resident physicians for performing self-stewardship!
  – Mr. Daniel Thirion for the DDD data
  – Harvard School of Public Health
Self-Stewardship – Step One

• Teach the general principles of stewardship and specifically address the most common infections (0.5 hour faculty time per month)
  – Pneumonia
  – COPD
  – Cellulitis
  – Diabetic Foot
  – UTI
  – C. difficile
Self-Stewardship – Step Two

• Formalize the process of “antibiotic timeouts”
• Create a **checklist tool** for residents to work with when addressing antibiotic use
• Utilize our existing hospital **guidelines**
• Put the process to work with **regular use**
Self-Stewardship – Step Three

• Feed back the results to the teams regularly
• Adjust emphasis to match patterns of misuse
Self-Stewardship – Step Four

• Evaluate our program’s impact more formally
  – Antibiotic Use
    • Cost, Local DDDs (total and targeted drugs)
  – C. difficile
    • Nosocomial rates per 10,000 patient days
DDD and related outcomes

- **Total cost**
  - adjust for current purchasing price

- **Target classes (why included):**
  - Moxifloxacin ($$$, CDAD OR 3.0)
  - Antipseudomonal Penicillins (overuse)
  - Carbepenems ($$$, protect against CRE)
  - Glycopeptides (monitoring, overuse, VRE)
Evaluating for an effect

Fig. 1. Average number of constant-size prescriptions per continuously eligible Medicaid patient per month among multiple drug recipients (2).

Table 1. Parameter estimates, standard errors and P-values from the full and most parsimonious segmented regression models predicting mean monthly numbers of prescriptions per patient in New Hampshire over time.

<table>
<thead>
<tr>
<th>Model Details</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>t-statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Full segmented regression model</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept $\beta_0$</td>
<td>5.1389</td>
<td>0.0748</td>
<td>68.69</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Baseline trend $\beta_1$</td>
<td>0.003481</td>
<td>0.006791</td>
<td>0.51</td>
<td>0.6128</td>
</tr>
<tr>
<td>Level change after cap $\beta_2$</td>
<td>-2.5931</td>
<td>0.1572</td>
<td>-16.49</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Trend change after cap $\beta_3$</td>
<td>0.0263</td>
<td>0.0193</td>
<td>1.36</td>
<td>0.1849</td>
</tr>
</tbody>
</table>
Gross Year-Year Savings $80,000 (50%)

- Figure removed pending publication
- We reduced monthly costs

P=0.046 for the level, no significant change on the trend
• Total monthly antibiotics (DDD/1000 days) were unchanged in both level and trend

• Limitation of DDD method
  – Example pneumonia (most common diagnosis on CTU):
    – Ceftriaxone + doxycycline (guideline) is two DDD per day
    – Moxifloxacin (not preferred) is only one DDD per day
• Figure removed pending publication
• We reduced moxifloxacin usage
• No significant change in VANCOMYCIN or PIPERACILLIN-TAZOBACTAM
• Vancomycin use always low and varies with MRSA pressure on the unit
• PIPERACILLIN-TAZOBACTAM use remains high due to:

(a) Health Care Associated Pneumonia
(b) importation of patients on this drug from elsewhere with failure to de-escalate.
(c) carbapenem non-use
• Figure removed pending publication
• We reduced carbepenem usage

P=0.03 level; p=0.98 trend
Self-Stewardship Results

• Some targeted antibiotics can be reduced
• Cost savings were achieved:
  – $2000/bed/year
• *C. difficile* rates went from 24.2 to 19.6 per 10,000 patient days (incidence rate ratio 0.8, 95% CI 0.5-1.3)
  – Impact of colonization pressure?
  – At $10,000 per nosocomial case, is even one case prevented “significant”? 
Despite these early successes opportunities to further improve use exist

- Gaining confidence with narrow spectrum agents
- Overcoming clinical inertia
- Addressing workflow issues
  - Resident time, automating data generation
- Reducing opportunities to (mis)use antibiotics through education and other non-antibiotic stewardship opportunities
UTI
Scope of the problem (MUHC)

- At MUHC (adult only) we did 38048 in 2012
- Each urine culture costs $7.40

- Total Cost (lab only) = $281555
  - Downstream costs exponentially more

Thanks to S. Verdon and M. Behr for the data
“If you build it, he will [probably] come…”
Downstream Impact of Urine Cultures Ordered without Indication at Two Acute Care Teaching Hospitals

Author(s): Jerome A. Leis, MD; Wayne L. Gold, MD; Nick Daneman, MD, MSc; Kaveh Shojania, MD; Allison McGeer, MD

Source: *Infection Control and Hospital Epidemiology*, Vol. 34, No. 10 (October 2013), pp. 1113-1114
CULTURES WITHOUT INDICATION VERY COMMON

INPATIENT CLINICAL YIELD EXTREMELY LOW (<2%)

UNNECESSARY ANTIBIOTICS IN UP TO 50%

RAISES THE QUESTION: DO THESE CULTURES DO MORE HARM THAN GOOD?
UTI

• Requires positive urinalysis (unless neutropenic) with symptoms attributable to lower or upper urinary tract
Emperic Diagnosis of UTI in Nursing Home Resident (without catheter)

• **3 symptoms and positive urinalysis:**
  – Fever (temperature of at least 38°C [100.4°F]).
  – New or increased frequency, urgency, burning
  – New flank or suprapubic pain or tenderness
  – Change in character of urine
  – Worsening of mental or functional status*
    • Not attributable to some other obvious cause

Conclusions

Urinary cultures provide little or no useful information when evaluating diffuse symptoms among elderly residents of nursing homes. Either common urinary tract pathogens are irrelevant, or urine culture is an inappropriate test.
Asymptomatic bacteriuria:

• Free guidelines available online from the IDSA

• Very common
  – especially in female patients from nursing homes, incontinent patients
Treatment of asymptomatic bacteriuria in adults should be limited:
- Pregnant women
- Upcoming invasive urologic procedure
  - TURP
  - Procedure where there will be mucosal bleeding
  - Doing a renal transplant
Randomized trials have shown no harm in not treating the average patient.

In healthy women treating ASB causes:

- **Increased** number of symptomatic UTIs compared to placebo
- Resistance
What about our special MUHC patients like renal transplant?
Consequences of treated versus untreated asymptomatic bacteriuria in the first year following kidney transplantation: retrospective observational study.

Green H, Rahamimov R, Goldberg E, Leibovici L, Gafter U, Bishara J, Mor E, Paul M.

Department of Nephrology and Hypertension, Rabin Medical Center, Beilinson Campus, Petah Tikva 49100, Israel. hefzigreen@gmail.com

<table>
<thead>
<tr>
<th></th>
<th>Treated (N=22)</th>
<th>Control (N=90)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary outcome</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean creatinine level (mg/dL), mean±SD</td>
<td>1.46±0.67</td>
<td>1.35±0.64</td>
</tr>
<tr>
<td>Reduction &gt;25% in eGFR</td>
<td>2 (9.1%)</td>
<td>1 (1.1%)</td>
</tr>
<tr>
<td>Pyelonephritis or urosepsis</td>
<td>2 (9.1%)</td>
<td>4 (4.4%)</td>
</tr>
<tr>
<td>Persistence of AB with the same pathogen</td>
<td>36 (40%)</td>
<td>12 (54.5%)</td>
</tr>
<tr>
<td>Hospitalization for symptomatic UTI</td>
<td>2 (9.1%)</td>
<td>4 (4.4%)</td>
</tr>
<tr>
<td><strong>Secondary outcomes—6 months</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in creatinine, median</td>
<td>−0.07 (−0.23 to +0.04), n=21</td>
<td>−0.09 (−0.23 to +0.06), n=87</td>
</tr>
<tr>
<td>(25th–75th percentile)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in eGFR, median</td>
<td>+3.7 (−2.6 to +12.2), n=21</td>
<td>+3.8 (−2.8 to +10.7), n=87</td>
</tr>
<tr>
<td>(25th–75th percentile)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyelonephritis or urosepsis</td>
<td>2 (9.1%)</td>
<td>8 (8.9%)</td>
</tr>
<tr>
<td>Symptomatic UTI treated with</td>
<td>12 (54%)</td>
<td>27 (30%)</td>
</tr>
<tr>
<td>antibiotics*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total hospital days 6 months post AB, median (range)*</td>
<td>4 (0–30)</td>
<td>0 (0–25)</td>
</tr>
</tbody>
</table>
Excluded 1st MONTH

Cohort study – but similar effects seen in three other cohorts
So what if you have a real UTI to treat?
## UTI – Hospitalized patients

<table>
<thead>
<tr>
<th>Condition</th>
<th>Pathogens</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute uncomplicated UTI, Complicated cystitis</td>
<td>Enterobacteriaceae (E. coli 89%), Staphylococcus saprophyticus</td>
<td>First choice TMP/SMX-DS 1 tab po bid x 3 days (7 days for complicated cystitis)</td>
</tr>
<tr>
<td>Acute, uncomplicated pyelonephritis (young female, outpatient, normal urinary tract, non-pregnant or diabetic)</td>
<td>Enterobacteriaceae (mostly E. coli) Enterococci*</td>
<td>First choice Ciprofloxacin 500 mg po bid X 7-14 days or TMP/SMX DS 1 tab po bid X 14 days</td>
</tr>
<tr>
<td>Acute pyelonephritis requiring hospitalization</td>
<td>Enterobacteriaceae (mostly E. coli) Enterococci</td>
<td>First choice Ciprofloxacin 400 mg IV/500 mg po q 12h or Ampicillin 1 g IV q 6h + Gentamicin 5-6 mg/kg IV q 24h ** X 10-21d</td>
</tr>
</tbody>
</table>
What “other forms of stewardship”

• A sneak peak at other ongoing projects
UTI is a **major driver** of antibiotic use

- How do we reduce UTIs?
UTI is a major driver of antibiotic use

• How do we reduce UTIs?
  – Call a spade a spade: don’t treat ASB
UTI is a major driver of antibiotic use

- How do we reduce UTIs?
  - Call a spade a spade: don’t treat ASB
  - Prevent UTIs in the first place
    - Avoid or remove Foley catheters unless highly necessary
    - Dr. Blair Schwartz’s project for his masters (MGH site)
- RVH Baseline data with thanks to Ms. Annie Chevrier
- Data 6 Med since 2013 (Thanks to senior residents!)
Foley reduction

• Agree upon evidence based indications for Foley catheters

• Encourage nursing and physicians to:
  – avoid insertion
  – pro-active in removal
6 Medical Foley Catheter Utilization
Pre (July/Aug 2012) and Post Jan to Oct 2013

P<0.0001 – hopefully will lead to dramatic reduction in nosocomial UTI rates
Preventing *C. difficile* is of paramount importance

- I finished by discussing other ways to reduce *C. difficile* which have been removed from the slides pending publication of the data.
Back to Dr. Frenette
What about ER?

- Realized that a significant proportion of AB were initiated in ER
  - It’s not me, it’s them....

- Project initiated in June 2013 (Andreanne Jean)
  - 1 Week MGH
  - 1 week RVH
  - AB initiated by ER only (Not consultants)
Results MGH ER

Figure 1. MGH ATB Use (Emergency Department)

Inappropriate: 17/24 = 71%

Appropriate: 7/24 = 29%

Table 1. Repartition of inappropriate ATB (MGH)

Choice

Indication: 1/17
Results RVH ER

Figure 2. RVH ATB Use (Emergency Departement)

Inappropriate: 13/21 = 62%

Appropriate: 8/21 = 38%

Table 2. Repartition of Inappropriate ATB (RVH)

Indication: 4/13 (31%)
### Table 4. Distribution of ATB prescription by indication

<table>
<thead>
<tr>
<th>Condition</th>
<th>Appropriate</th>
<th>Inappropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>COPD</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>UTI</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Intra-abdo</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>SST</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>C. Diff</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>EENT</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Sepsis</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>SSI</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Table 3. Distribution of ATB prescription by agent

<table>
<thead>
<tr>
<th>Agent</th>
<th>Appropriate</th>
<th>Inappropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tarocin</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Avelox</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Cipro</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Vanco</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Ancel</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Clinda</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Septra</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Flagyl</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Genta</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Legend: Green = Appropriate  Red = Inappropriate
Description of inappropriate ATB use

1. First line agent for COPD exacerbation:

   - Avelox IV/PO prescribed but no risk factors for resistance

   - First choice:
     - Amoxil PO
     - Septra PO
     - Doxy PO

   Decrease use of Quinolones:
   - Risk of C. diff
   - Good agent for resistant pathogens

PCR for respiratory viruses very useful for clinical decision
Description of inappropriate ATB use

2. First line agent for UTI lower:
   - Cipro PO prescribed but acute uncomplicated UTI
   - First choice:
     - Septra PO
     - Nitrofurantoin PO

Decrease use of Quinolones:
- Risk of C. diff
- Good agent for resistant pathogens
Description of inappropriate ATB use

• 5. Vancomycin use empirically:
  • low risk febrile neutropenia:
  • 2 patients received Tazo IV + Cipro IV + Vanco IV without risk for MRSA infection

Indication for Vanco in febrile neutropenia:

Suspected KT infection
Blood cultures with GPC
Known MRSA
Allmost all nosocomial MRSA BSI occur in known carriers
CA- MRSA still has a limited niche
IVDA, homeless, prisoners
Native Communities upnorth, Indian reserves
Some North American Region (Western Canada)
Nosocomial S. aureus BSI MUHC
Most Nosocomial MRSA BSI occur in Known MRSA carriers
Utility of prior screening for methicillin-resistant *Staphylococcus aureus* in predicting resistance of *S. aureus* infections

Derek R. MacFadden MD, Marion Elligsen RPh, Ari Robicsek MD, Daniel R. Ricciuto MD, Nick Daneman MD MSc

This is a synopsis of a paper at www.cmaj.ca/lookup/doi/10.1503/cmaj.130364

**Abstract**

**Background:** Screening for methicillin-resistant *Staphylococcus aureus* (MRSA) is intended to reduce nosocomial spread by identifying patients colonized by MRSA. Given the widespread use of this screening, we evaluated its potential clinical utility in predicting the resistance of clinical isolates of *S. aureus*.

**Methods:** We conducted a 2-year retrospective cohort study that included patients with documented clinical infection with *S. aureus* and prior screening for MRSA. We determined test characteristics, including sensitivity and specificity, of screening for predicting the resistance of subsequent *S. aureus* isolates.

**Results:** Of 510 patients included in the study, 53 (10%) had positive results from MRSA screening. With 99% (95% confidence interval [CI] 98%–100%) specificity and 63% (95% CI 52%–74%) sensitivity. When screening swabs were obtained within 48 hours before isolate collection, sensitivity increased to 91% (95% CI 71%–99%) and specificity was 100% (95% CI 97%–100%), yielding a negative likelihood ratio of 0.09 (95% CI 0.01–0.3) and a negative predictive value of 98% (95% CI 95%–100%). The time between swab and isolate collection was a significant predictor of concordance of methicillin resistance in swabs and isolates (odds ratio 6.6, 95% CI 1.6–28.2).

**Interpretation:** A positive result from MRSA screening predicted methicillin resistance in a culture-positive clinical infection with *S. aureus*. Negative results on MRSA screening were most useful for excluding methicillin resistance of a subsequent *S. aureus* isolate.
Nosocomial Infection sensitivities MUHC – including all BSI
Tazocin: indications

• Nosocomial infections:
  1. Nosocomial pneumonia
  2. Nosocomial intra-abdominal infection
  3. Endomyometritis, early post-partum

• Community-acquired infections:
  1. Aspiration pneumonia
  2. Febrile neutropenia
  3. Severe cellulitis, necrotizing fasciitis
  4. Diabetic foot Infection

Important to differentiate between community acquired and nosocomial infection
Case Control Study CDI
Charles Lemoyne Hospital HCLM 2003-04
Validity of diagnosis 79 %
Appropriate choice AB 78 %

n=117

[Bar chart showing percentages for different categories: Neutrop, SSI-Chir, Urin, Prophylax, Resp.Autre, Pneumo, Abdom, Cell. Each category has two bars representing 'ChoixOk' and 'Dgx Val'.]
Who is the black sheep?

- Awareness
- Leadership support
Future

- Expansion
  - General surgery
  - ICU
- Difficult areas
  - ICU
  - ER
  - Hem Onc
- Antifungals
- Surgical prophylaxis
What is needed at MUHC

- Information technology for:
  - Computer order entry
  - Clinical decision support
  - Integrate culture results
  - Adjust for renal function
  - Adjust for drug interactions
  - Allergies and cost considerations
  - Computer based surveillance
  - Real time data on consumption

- Full time dedicated pharmacist
Qi improvement Model based on surveillance

Sélectionner des antibiotiques cibles à surveiller

Mesurer les résultats

Apporter une rétroaction (feed-back) aux prescripteurs

Développer des critères d’utilisation

Développer des mesures éducatives

Programme de surveillance continue

Effectuer des revues d’utilisation ou surveillance sur une base régulière

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"An idea that is developed and put into action is more important than an idea that exists only as an idea" — Buddha

It is easier to divert a river than to change behavior…