SHS + UHN ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

Stewarding One of Healthcare's Anchors: Antimicrobials

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@ASPphysician

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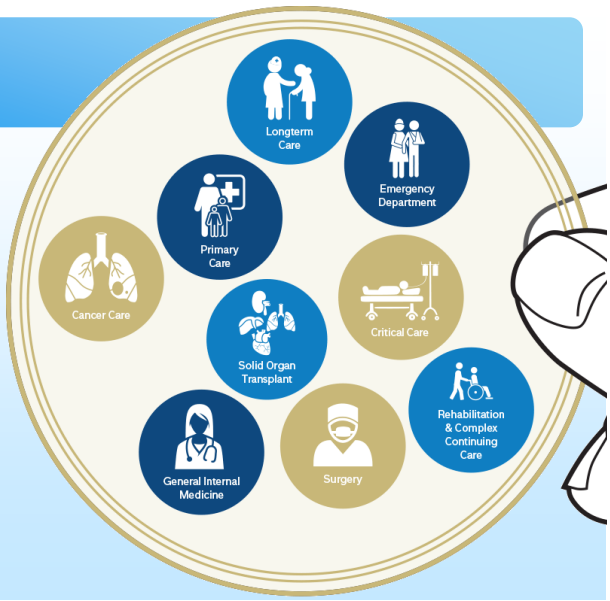
Our Team

Clinical
Operational
Research
Learners



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Our program was 2 people rounding daily in the ICU here at Mount Sinai Hospital 8 years ago

	2008		2009	
	February (DDD/100 pt days)	March (DDD/100 pt days)	February (DDD/100 pt days)	March (DDD/100 pt days)
Antibacterials That Cover Non-Lactose Fermenting Gram Negative Bacilli	53.55	56.46	45.59	45.09
Antibacterials That Cover Lactose Fermenting Gram Negative Bacilli	38.76	30.54	36.83	45.40
Ratio of NLF Covering/LF Covering Antibiotics	1.3816	1.8487	1.2379	0.9932
Antimicrobial Costs	$36,178.93		$19,102.31	

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and has grown in complexity, and in volume

Indicators	FY 08/09 (Pre-ASP)	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY 15/16	FY16/17 Performance Q1	Q2	Q3	Q4	YTD	YTD of Previous Year
Antimicrobial Usage and Costs														
Total Antimicrobial DDDs/100 Patient Days	**177**	**171**	**144**	**167**	**170**	**172**	**164**	**156**	**142**	**142**			**142**	**162**
Systemic Antibacterial DDDs/100 Patient Days	142	128	111	128	127	123	136	116	108	106			107	128
Systemic Antifungal DDDs/100 Patient Days	31	24	20	33	35	41	25	32	29	26			28	30
Total Antimicrobial Costs	$332,724	$285,975	$193,129	$279,859	$291,470	$424,044	$232,814	$274,258	$59,907	$53,895			$113,802	$117,348
Total Antimicrobial Costs/Patient Day	**$69.01**	**$59.23**	**$40.95**	**$59.22**	**$62.37**	**$85.36**	**$62.54**	**$61.45**	**$49.55**	**$46.91**			**$48.26**	**$57.44**
Systemic Antibacterial Costs	$174,339	$142,134	$95,773	$125,339	$134,811	$108,886	$92,928	$68,246	$15,318	$14,278			$29,596	$42,209
Systemic Antibacterial Costs/Patient Day	$36.16	$29.44	$20.31	$26.94	$28.85	$21.92	$20.71	$15.29	$12.67	$12.43			$12.55	$20.66
Systemic Antifungal Costs	$143,100	$132,519	$88,998	$141,877	$144,811	$296,573	$134,504	$189,661	$42,494	$35,494			$77,988	$65,693
Systemic Antifungal Costs/Patient Day	$29.68	$27.45	$18.87	$30.50	$30.99	$59.70	$40.53	$42.50	$35.15	$30.89			$33.07	$32.16
Antibacterial Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	n/a	111	109	115	107	105			106	104
Antifungal Days of Therapy/100 Patient Days*	n/a	n/a	n/a	n/a	n/a	17	21	27	20	21			20	19
Patient Care Outcomes														
Hospital-Acquired C. difficile Cases (rate per 1,000 pt days)	NA	NA	NA	5 (1.07)	8 (1.71)	4 (0.91)	7 (1.59)	5 (1.12)	0 (0.00)	0 (0.00)			0 (0.00)	3 (1.47)
ICU Average Length of Stay (Days)	5.84	5.57	5.67	5.51	5.24	6.10	5.26	4.45	4.18	4.33			4.26	3.71
ICU Mortality Rate (as a %)	20.1	17.6	16.3	16.5	17.04	15.3	13.9	14.2	9.5	12.7			11.1	13.8
ICU Readmission Rate Within 48 Hrs (as a %)	3.2	2.9	2.7	2.7	1.86	3.2	2.6	2.1	3.2	0.0			0.9	2.4
ICU Ventilator Days	NA	3286	2934	2677	2749	3069	2597	2504	552	616			1168	1025
ICU Multiple Organ Dysfunction Score (MODS)	4.00	4.04	4.12	4.25	4.62	4.87	4.73	4.43	3.6	3.95			3.78	4.28

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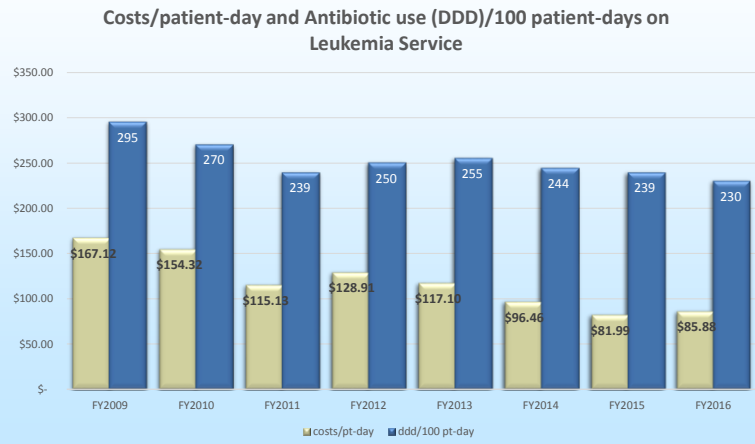
Using multiple approaches, we have helped reduce antibiotic use in patients with leukemia by 22%, and antibiotic costs by 49%



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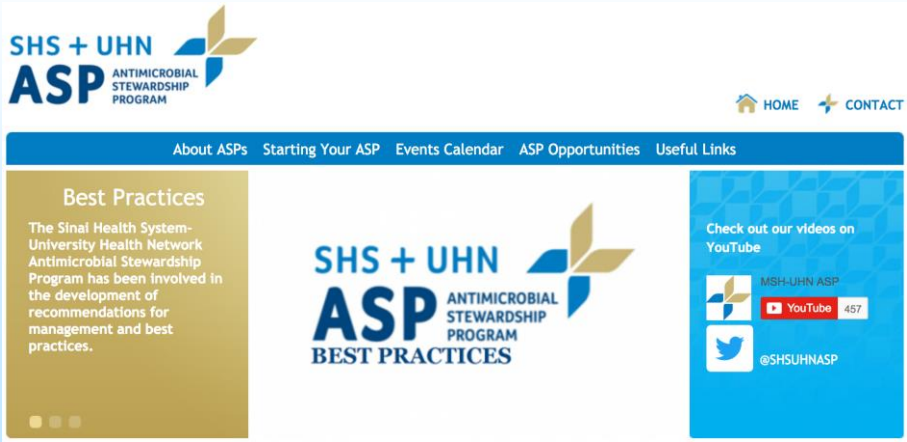
We spent time developing evidence-based, accessible best practices (antimicrobialstewardship.ca)



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High-Risk Febrile Neutropenia Protocol for Patients with Hematological Malignancy

www.antimicrobialstewardship.com

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Last updated: October, 2014.
Approved by Pharmacy & Therapeutics at UHN and MSH in October 2014
Questions/comments: Email to miranda.so@uhn.ca
Approved by UHN and MSH Medical Advisory Committee December 2014.

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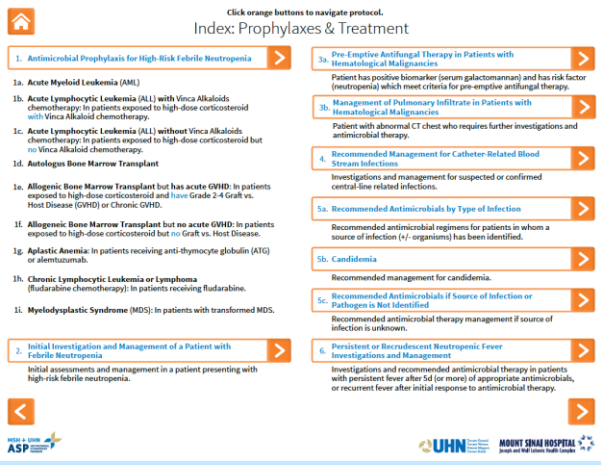

Click orange buttons to navigate protocol.

Index: Prophylaxes & Treatment

1. Antimicrobial Prophylaxis for High-Risk Febrile Neutropenia
   - 1a. Acute Myeloid Leukemia (AML)
   - 1b. Acute Lymphocytic Leukemia (ALL) with Vinca Alkaloids chemotherapy: In patients exposed to high-dose corticosteroid with Vinca Alkaloid chemotherapy.
   - 1c. Acute Lymphocytic Leukemia (ALL) without Vinca Alkaloids chemotherapy: In patients exposed to high-dose corticosteroid but no Vinca Alkaloid chemotherapy.
   - 1d. Autologus Bone Marrow Transplant
   - 1e. Allogenic Bone Marrow Transplant but has acute GVHD: In patients exposed to high-dose corticosteroid and have Grade 2-4 Graft vs. Host Disease (GVHD) or Chronic GVHD.
   - 1f. Allogeneic Bone Marrow Transplant but no acute GVHD: In patients exposed to high-dose corticosteroid but no Graft vs. Host Disease.
   - 1g. Aplastic Anemia: In patients receiving anti-thymocyte globulin (ATG) or alemtuzumab.
   - 1h. Chronic Lymphocytic Leukemia or Lymphoma (fludarabine chemotherapy): In patients receiving fludarabine.
   - 1i. Myelodysplastic Syndrome (MDS): In patients with transformed MDS.
2. Initial Investigation and Management of a Patient with Febrile Neutropenia
   - Initial assessments and management in a patient presenting with high-risk febrile neutropenia.
3a. Pre-Emptive Antifungal Therapy in Patients with Hematological Malignancies
   - Patient has positive biomarker (serum galactomannan) and has risk factor (neutropenia) which meet criteria for pre-emptive antifungal therapy.
3b. Management of Pulmonary Infiltrate in Patients with Hematological Malignancies
   - Patient with abnormal CT chest who requires further investigations and antimicrobial therapy.
4. Recommended Management for Catheter-Related Blood Stream Infections
   - Investigations and management for suspected or confirmed central-line related infections.
5a. Recommended Antimicrobials by Type of Infection
   - Recommended antimicrobial regimens for patients in whom a source of infection (+/- organisms) has been identified.
5b. Candidemia
   - Recommended management for candidemia.
5c. Recommended Antimicrobials if Source of Infection or Pathogen is Not Identified
   - Recommended antimicrobial therapy management if source of infection is unknown.
6. Persistent or Recrudescent Neutropenic Fever Investigations and Management
   - Investigations and recommended antimicrobial therapy in patients with persistent fever after 5d (or more) of appropriate antimicrobials, or recurrent fever after initial response to antimicrobial therapy.

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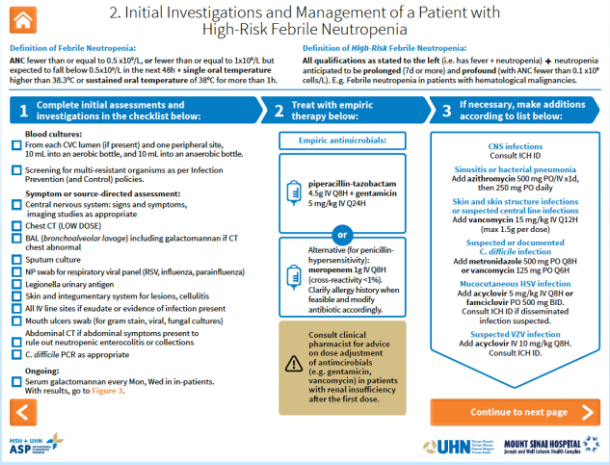

2. Initial Investigations and Management of a Patient with High-Risk Febrile Neutropenia

Definition of Febrile Neutropenia:
ANC fewer than or equal to 0.5 x10⁹/L, **or** fewer than or equal to 1x10⁹/L but expected to fall below 0.5x10⁹/L in the next 48h + **single oral temperature** higher than 38.3°C or **sustained oral temperature** of 38°C for more than 1h.

Definition of *High-Risk* Febrile Neutropenia:
All qualifications as stated to the left (i.e. has fever + neutropenia) + neutropenia anticipated to be **prolonged** (7d or more) and **profound** (with ANC fewer than 0.1 x10⁹ cells/L). E.g. Febrile neutropenia in patients with hematological malignancies.

1 Complete initial assessments and investigations in the checklist below:

Blood cultures:
- ☐ From each CVC lumen (if present) and one peripheral site, 10 mL into an aerobic bottle, and 10 mL into an anaerobic bottle.
- ☐ Screening for multi-resistant organisms as per Infection Prevention (and Control) policies.

Symptom or source-directed assessment:
- ☐ Central nervous system: signs and symptoms, imaging studies as appropriate
- ☐ Chest CT (LOW DOSE)
- ☐ BAL (*bronchoalveolar lavage*) including galactomannan if CT chest abnormal
- ☐ Sputum culture
- ☐ NP swab for respiratory viral panel (RSV, influenza, parainfluenza)
- ☐ Legionella urinary antigen
- ☐ Skin and integumentary system for lesions, cellulitis
- ☐ All IV line sites if exudate or evidence of infection present
- ☐ Mouth ulcers swab (for gram stain, viral, fungal cultures)
- ☐ Abdominal CT if abdominal symptoms present to rule out neutropenic enterocolitis or collections
- ☐ *C. difficile* PCR as appropriate

Ongoing:
- ☐ Serum galactomannan every Mon, Wed in in-patients. With results, go to Figure 3.

2 Treat with empiric therapy below:

Empiric antimicrobials:

piperacillin-tazobactam 4.5g IV Q8H + **gentamicin** 5 mg/kg IV Q24H

or

Alternative (for penicillin-hypersensitivity): **meropenem** 1g IV Q8H (cross-reactivity <1%). Clarify allergy history when feasible and modify antibiotic accordingly.

Consult clinical pharmacist for advice on dose adjustment of antimicrobials (e.g. gentamicin, vancomycin) in patients with renal insufficiency after the first dose.

3 If necessary, make additions according to list below:

CNS infections
Consult ICH ID

Sinusitis or bacterial pneumonia
Add **azithromycin** 500 mg PO/IV x1d, then 250 mg PO daily

Skin and skin structure infections or suspected central line infections
Add **vancomycin** 15 mg/kg IV Q12H (max 1.5g per dose)

Suspected or documented *C. difficile* infection
Add **metronidazole** 500 mg PO Q8H **or vancomycin** 125 mg PO Q6H

Mucocutaneous HSV infection
Add **acyclovir** 5 mg/kg IV Q8H **or famciclovir** PO 500 mg BID. Consult ICH ID if disseminated infection suspected.

Suspected VZV infection
Add **acyclovir** IV 10 mg/kg Q8H. Consult ICH ID.

Continue to next page

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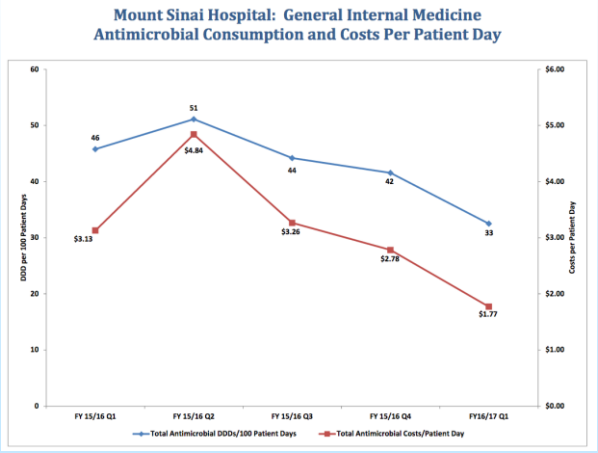
We are no longer only using data to show that we are changing behaviour



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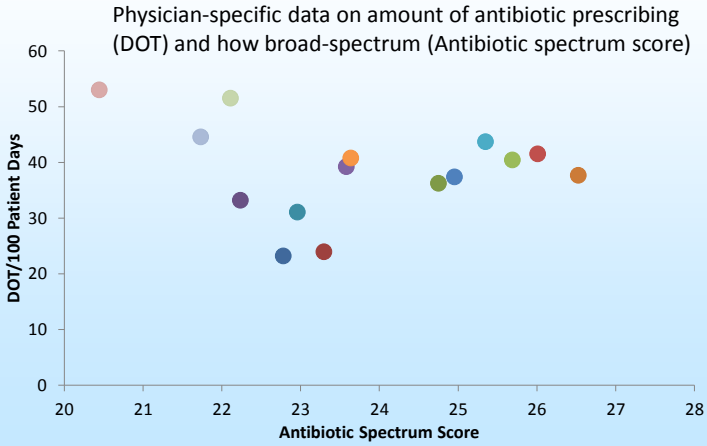
But are using data to change behaviour locally



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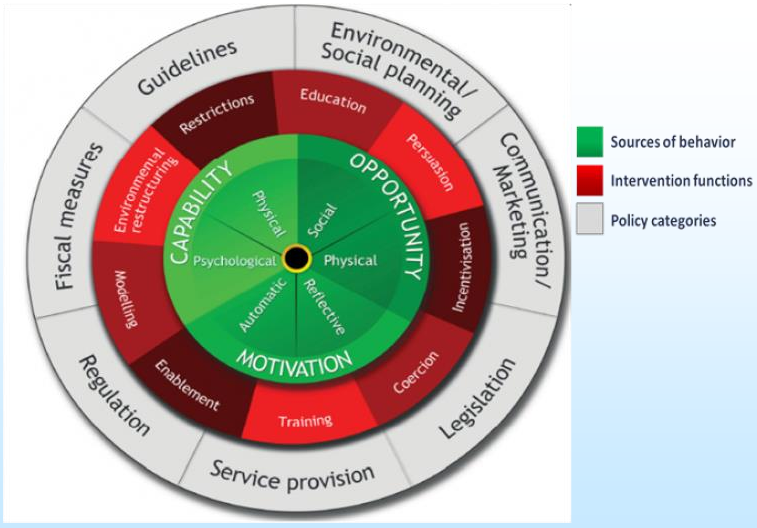

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ARTIC (Adopting Research To Improve Care) starting off with a model that looks right

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ARTIC: then putting the framing elements in place

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First the large framework

Health Sciences North
Horizon Santé-Nord

CHEO
RESEARCH INSTITUTE | INSTITUT DE RECHERCHE

The Ottawa Hospital | L'Hôpital d'Ottawa

SickKids

St. Joseph's
Healthcare Hamilton

Hamilton Health Sciences

CAHO
Council of Academic Hospitals of Ontario

KGH
Kingston General Hospital

London Health Sciences Centre

St. Michael's
Inspired Care.
Inspiring Science.

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ARTIC 2.0: and then adding detail to the Model

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Ontario
Health Quality Ontario

Hamilton Health Sciences

CAHO
Council of Academic Hospitals of Ontario

Lakeridge Health

London Health Sciences Centre

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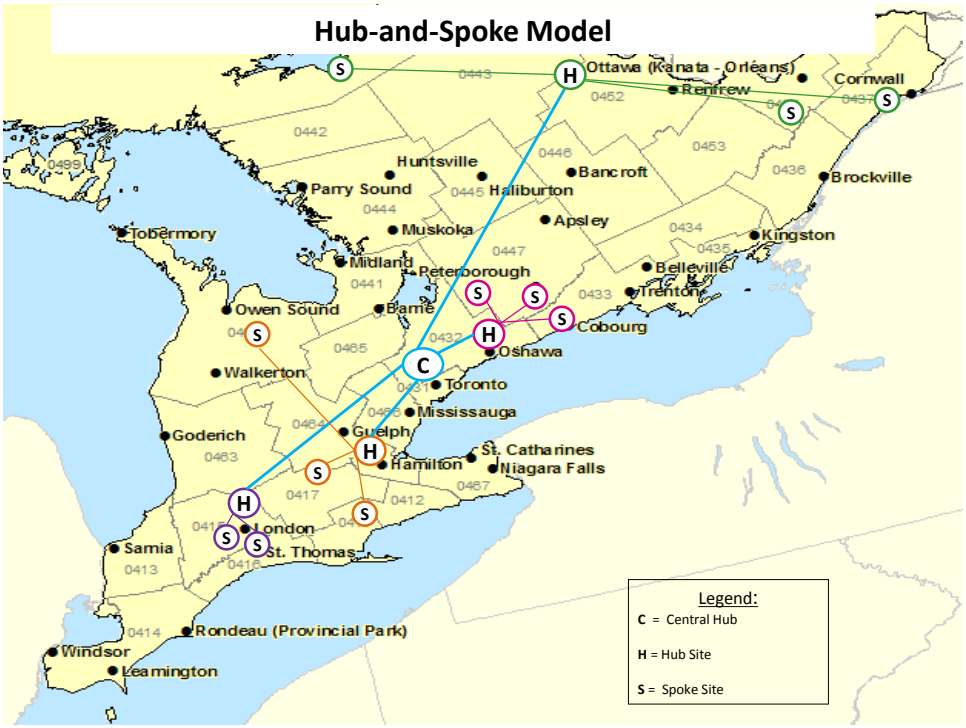

Primary Care Antimicrobial Stewardship

- Pilot project led by Dr. France Légaré for Primary Care ASP in Family Practice Teaching Units in Québec
- focused on ABx use in acute respiratory infections
- Intervention: 2h online tutorial → 2h interactive seminar about shared decision-making

Legare F et al. CMAJ. 2012;184:E726-34

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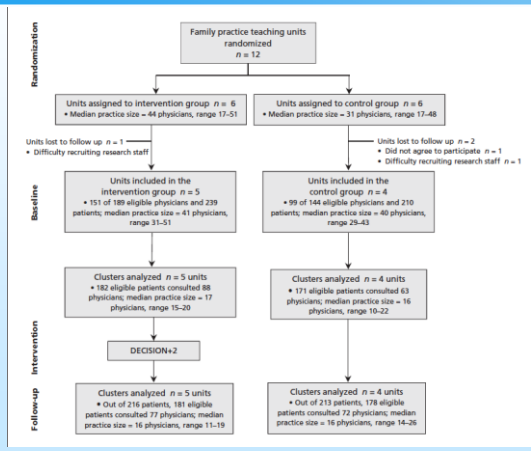
Primary Care Antimicrobial Stewardship



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Primary Care Antimicrobial Stewardship

- Pilot project led by Dr. France Légaré for Primary Care ASP in 5 Family Practice Teaching Units (77 MDs) in Québec
- focused on ABx use in acute respiratory infections
- Intervention: 2h online tutorial ➜ 2h interactive seminar about shared decision-making

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Primary Care Antimicrobial Stewardship

Table 3: Proportion of patients deciding to use antibiotics immediately after consulting with their physician before and after the intervention, by study group, family practice teaching unit, type of physician and patient age group

Variable	% of patients deciding to use antibiotics immediately after consultation				Absolute difference	Adjusted relative risk* (95% CI)
	At baseline		After intervention			
	Intervention units $n = 5$	Control units $n = 4$	Intervention units $n = 5$	Control units $n = 4$		
Teaching unit						
All units	41.2	39.2	27.2	52.2	25.0	0.5 (0.3 to 0.7)
Type of physician						–
Resident	37.5	44.4	28.6	46.7	18.1	0.6 (0.4 to 0.9)
Teacher	44.1	36.8	25.7	56.3	30.6	0.5 (.3 to 0.7)
Patient age group						
Adults	41.9	39.8	26.6	50.7	24.1	0.5 (0.4 to 0.8)
Children	40.0	36.8	27.1	65.5	38.4	0.4 (0.3 to 0.7)

Note: CI = confidence interval.
*Adjusted for cluster design, baseline values and patient age group (for analyses at teaching-unit and physician levels).

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Primary Care Antimicrobial Stewardship

- Pilot project led by Dr. Warren McIsaac for Primary Care ASP in 3 Academic Family Health Teams
- using education, decision aids, audit and feedback to change behaviour (cough, sinusitis, sore throat, urinary tract infect^{n})
- funded by SHS and UHN Alternative Funding Plan Innovation Fund

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Primary Care Antimicrobial Stewardship

- being expanded to ~60 family physicians around GTA affiliated with the UTOPIAN research platform
- being rolled out over next 2 years
- will reduce to just respiratory tract conditions

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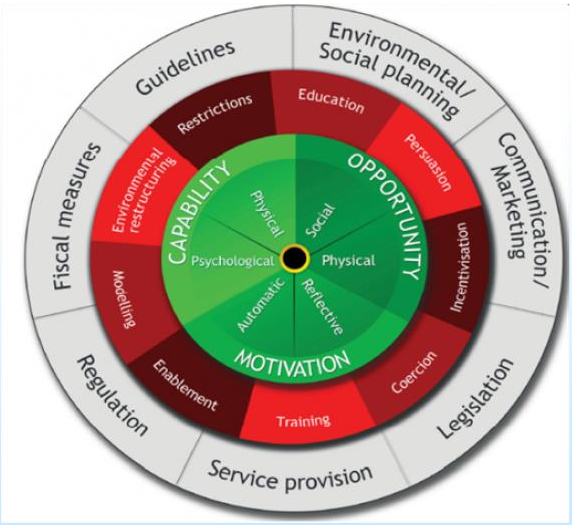

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JEDI and SABR

- JEDI = Judicious Evaluation of antimicrobial Decision making
  - Weekly audit and feedback of appropriateness of antimicrobial prescriptions
- SABR = Stewardship At Bedside Rounds
  - Baseline mapping of decision-making
  - Introduction of nurse into an active role in stewardship
  - Integration of antimicrobial decision making framework into team rounds
  - Shift to ASP team nudge

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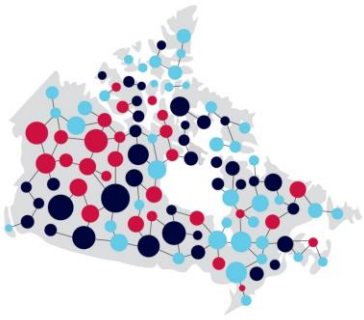
CANresist.com

CANresist

Canadian Network for Antimicrobial Resistance
Réseau canadien contre la résistance aux antimicrobiens



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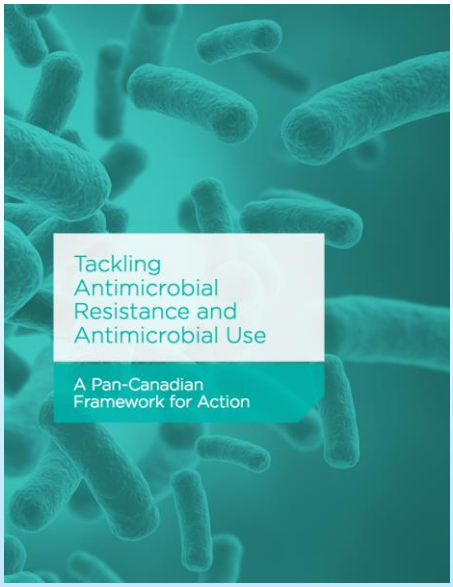

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CANresist
Canadian Network for Antimicrobial Resistance
Réseau canadien contre la résistance aux antimicrobiens

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Summary

- AMR and antimicrobial stewardship is, primarily, about behaviour change
- Antimicrobial prescribing behaviour is complex, and change requires a variety of approaches (cf. The Behaviour Change Wheel)
- we all *CANresist* … probably our best hope of making a huge difference in Canada

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