



# Achieving quality in IPC: Where have we reached and what challenges (opportunities) lie ahead?

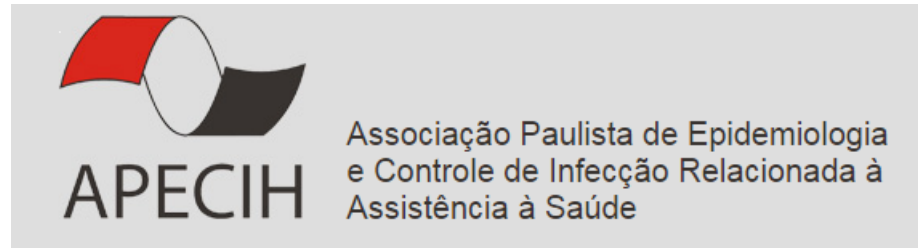
Candace Friedman  
28 September 2017

# Happy 30<sup>th</sup> Anniversary!



## Objectives:

- Exchange knowledge
- Facilitate networking to improve IPAC



## Objectives:

- Share knowledge
- Promote or attend conferences courses, seminars and technical meetings
- Promote and encourage quality of care and safety of health professionals
- Professional recognition
- Provide scientific support to professionals and organizations
- Increase research and scientific improvement



# 6 Areas of IPAC Activity - Challenges & Opportunities

1. Definitions
2. Surveillance
3. Investigations
4. Guidelines
5. Interventions
6. Program/Practitioners



# 1. Definitions - USA - Improvements

CDC 1970	CDC 1988	CDC 2002	CDC 2017
<b>Bloodstream Infection</b> <ul style="list-style-type: none"><li>• Culture documented bacteremia</li></ul>	<b>Laboratory-confirmed Bloodstream Infection</b> <ul style="list-style-type: none"><li>• Pathogen in blood</li></ul>	<b>Laboratory-confirmed Bloodstream Infection</b> <ul style="list-style-type: none"><li>• CLABI when a CL</li></ul>	<b>Bloodstream Infection Event</b> <ul style="list-style-type: none"><li>• CLABSI &amp; Non-CLABSI</li><li>• Added Mucosal Barrier Injury - LCBI<ul style="list-style-type: none"><li>• Intestinal microbes</li><li>• Stem cell TXP/ neutropenic</li></ul></li></ul>

- Terminology and criteria changes
- Gap between clinical & surveillance definitions - Adding more discreet data, e.g., lab values; affected by individual lab practices



# Definitions - Challenge: Accuracy of definition

Location type	No. of locations	No. of CLABSIs	No. of MBI-LCBIs	Central line days	CLABSI rate* (including MBI-LCBI events)	CLABSI rate* (excluding MBI-LCBI events)	Change in CLABSI rate when MBI-LCBI excluded, % (95% confidence interval)
<b>Oncology</b>							
Adult oncology critical care	19	57	17	53,337	1.07	0.75	29.8 (5.2% to 44.3%)
Adult oncology ward	413	2,559	1,172	1,392,652	1.84	1	45.8 (43.6% to 47.8%)
Pediatric oncology critical care	3	8	2	2,724	2.94	2.2	25.0 (-144.3% to 55.7%)
Pediatric oncology ward	88	679	327	330,884	2.05	1.06	48.2 (43.9% to 51.8%)
<b>All locations</b>	16,755	19,130	2,017	20,691,116	0.92	0.83	10.5 (9.3% to 11.8%)

**10% of CLABSI not catheter related**

**Affects Interventions, Reporting!**

CLABSI rates reported to the National Healthcare Safety Network from short-term acute care hospitals, stratified by location type and calculated both including and excluding Mucosal Barrier Injury -LCBI events, 2014

See I, et al. *Am J Infect Control* 2017; 45 (3): 321-323



## 2. Surveillance - Challenges/Opportunities

### ➤ Surveillance in non-hospital settings

- Long term care
- Ambulatory/community care
- Rehabilitation centres
- Home care

- Definitions
- Comparison data
- Surveillance techniques

### ➤ Accuracy

- *Am J Infect Control* - 22 surveillance definition case studies reviewed [Wright MO, et al. 2017; 45: 607-611]
- Only correct 62% of time



# Challenge: Accuracy of surveillance

Post colon procedures - validation study: variation in case-finding & use of definitions

CT DPH reports	Connecticut hospital reports to National Healthcare Safety Network		
	SSI	No-SSI	Total
SSI	67 (66%) (true positives)	35 (34%) (false negatives)	102
No SSI	1 (false positives)	589 (true negatives)	590
Total	68	624	692

Actual SSIs

NOT REPORTED TO NHSN

Backman LA, et al. *Am J Infect Control* 2017;45: 690-691



# Surveillance - Automation Challenge

## ASSESSMENT OF AN AUTOMATED SURVEILLANCE SYSTEM FOR DETECTION OF VENTILATOR ASSOCIATED EVENTS

Comparison of VAC assessment between electronic surveillance and gold standard chart review

N= 231		Chart Review [GOLD STANDARD]	
		No ventilator-associated condition	Ventilator-associated condition
Electronic Surveillance	No ventilator-associated condition	185	3
	Ventilator-associated condition	2	41

44 VACs based on Gold Standard

\*Nuckchady D, et al. *Am J Infect Control* 2015; 43: 1119-1121





# Surveillance → Investigations

- ▶ 1946-1979 - Primarily *S. aureus*
- ▶ 1980-1989 - Primarily *Pseudomonas sp*
- ▶ 1990-1999 - Primarily mycobacteria & Gram negatives
- ▶ 2000-2005 - Primarily *S. aureus*
- ▶ 2005-2010 - Primarily hepatitis, *S. aureus*, norovirus
- ▶ Recent - Fungal infections, CRE, *B. cepacia*

From USA's CDC investigations



# 3. Investigations - Challenges/Opportunities

- ▶ New lab tests/practices
- ▶ Electronic health record
- ▶ New (old?) microbes
- ▶ Invasive devices
- ▶ Environment



# Lab Tests - Molecular Diagnostics

- ▶ On demand Polymerase Chain Reaction Technology
  - ▶ Identify pathogens early to target therapy
  - ▶ Define outbreaks

Spencer M, et al. *Am J Infect Control* 2015; 43: 1102-8

Molecular epidemiology of *Klebsiella pneumoniae* carbapenemase-producing Enterobacteriaceae in different facilities in Southern Brazil

Arend LN, et al. *Am J Infect Control* 2015; 43: 137-143

Hospitals Will Soon Be Able to Rapidly Identify Life-threatening Bacteria

**Infectious Disease Next Generation Sequencing Based Diagnostic Devices: Microbial Identification and Detection of Antimicrobial Resistance and Virulence Markers**



American Journal of Infection Control

Volume 45, Issue 2, 1 February 2017, Pages 170–179



State of the Science Review

Infection control in the new age of genomic epidemiology

Patrick Tang, MD, PhD<sup>a, c, e</sup>, Matthew A. Croxen, PhD<sup>b</sup>, Mohammad R. Hasan, PhD<sup>a, c</sup>, William W.L. Hsiao, PhD<sup>b, d</sup>, Linda M. Hoang, MD<sup>b, d</sup>

INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY JULY 2015, VOL. 36, NO. 7

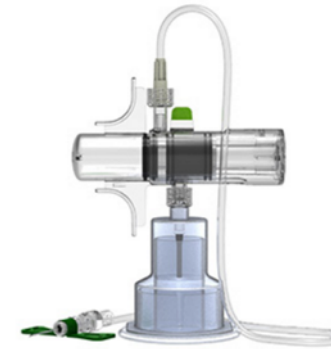
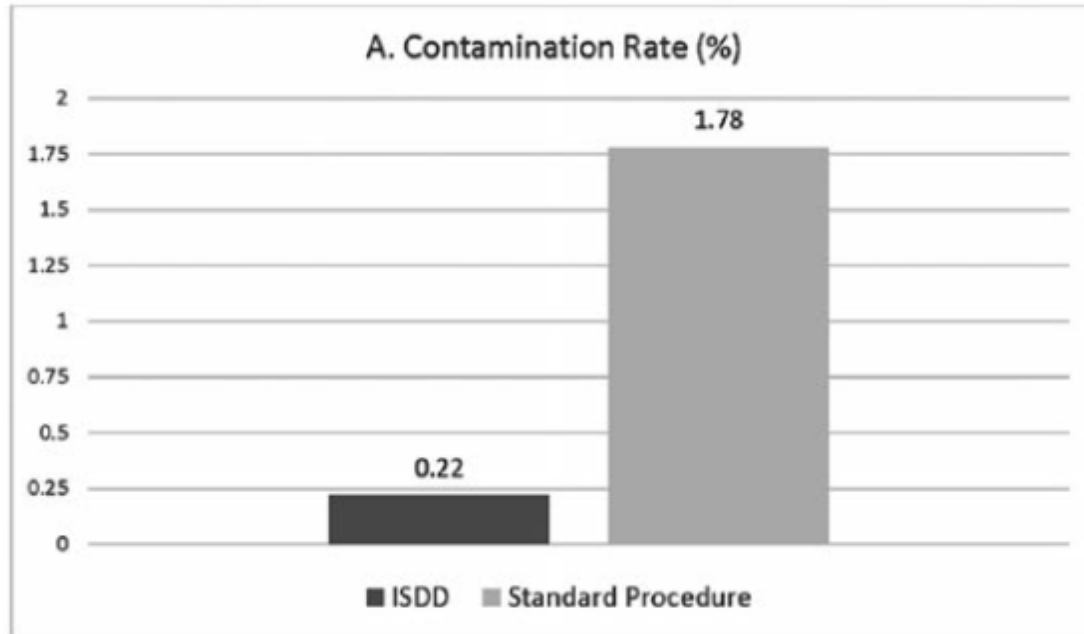
ORIGINAL ARTICLE

**Whole-Genome Sequencing for Outbreak Investigations of Methicillin-Resistant *Staphylococcus aureus* in the Neonatal Intensive Care Unit: Time for Routine Practice?**

**Rapid response to outbreaks.** The CDC used advanced molecular detection technology to sequence the DNA of bacteria, viruses, parasites and fungi and then used supercomputers to discover molecular patterns to better understand diseases. The process helped identify a source of a Legionnaires' disease outbreak and is being used to map Zika virus strains.



# Lab Practices - Opportunity: Decrease blood culture contamination



Device diverts initial blood collected

Initial Specimen Diversion Device used vs. Standard phlebotomy procedure



# Investigations: Electronic Health Record

The screenshot displays the Allscripts Professional EHR interface for patient DALEY, Ms. Deanna. The patient's demographic information includes a birth date of 2/15/1981, age of 29, gender of Female, insurance of Blue Cross & Blue Shield, and ID #210. Her status is Active, and her usual location is Neuron, Nate. Her allergies are listed as Latex and No Known Drug Allergies. Her guarantor is Deanna Daley, and her marital status is Single with a blood type of O+ (Patient reported).

The interface is divided into several main sections:

- Medical History: Newest to oldest**: This section contains a tree view of medical history categories. Under "Problem List/Past Medical", there are entries for "MIGRAINE WITH AURA, NON-INTRACTABLE (346.00)" and "COMMON MIGRAINE WITHOUT MENTION OF INTRACTABLE MIGRAINE (346.00)". Under "Allergy", there are entries for "Latex: Rash, Hives" and "No Known Drug Allergies". Other categories include Immunization, Family (with negative family history for CVA, TIA, Temporal Arteritis, Major Depression, and first-degree relatives with headaches), Social (with no drug use, non-smoker status, caffeine use of 2-3 cups/day, and occasional alcohol use), Pregnancy/Birth (with one pregnancy in 2006), Past Surgical (with an appendectomy in 1999 and hospitalizations in 1996 and 2003), and Other Past History (with chronic migraine, head injury, mononucleosis, psychological stress, congestive heart failure in 2004, and unspecified diagnosis).
- Encounters: By Type, Newest to Oldest**: This section shows a list of encounter types, including Consultation, Office Visit, [Open Encounter], Chart Attachments, Labs/Procedures, and Referral Letter.
- Medications: All, Newest to Oldest**: This section is divided into Current Medications, Administered Medications, and Previous Medications. Current medications include Maxalt 5MG (one tablet at onset of headache), Amoxicillin 125MG/5ML (one for suspension daily), and Cipro 250MG (one tablet BID). Administered medications include Imitrex 5MG/ACT (two injections not specified).
- Orders: All, Newest to Oldest**: This section shows future orders, including a metabolic panel, sed rate erythrocyte, TSH (thyroid stimulating hormone), and CBC, platelets & APT diff.

The interface also includes a left-hand navigation menu with options like Face Sheet, Patient Manager, Demographics, Reminders, Flow Sheets, Immunizations, Medication Admin, Chart Attachments, Lab Results, Procedure Results, Additional Results, Result Summaries, Contact, Reason for Visit, Review of Systems, and History. A right-hand sidebar contains an Actions menu with options like Send Message, Launch, Print, Queues (Received Charts, Appointments, Open Encounters, Result Notifications, Messages, Web Messages, Refill Requests, eRefill Requests), and a bottom status bar.



# EHR - Predictive Analytics

- ▶ Can health care data predict patients at risk for HAI?
- ▶ If yes, then what?
  - ▶ Identify extraordinary interventions?
  - ▶ Identify patients NOT receiving prophylactic antibiotics properly?
  - ▶ Identify patients no longer needing a urinary catheter?
  - ▶ Other??

**Development And Implementation Of A Machine-Learning Algorithm For Early Identification Of Sepsis  
In A Multi-Hospital Academic Healthcare System**

Giannini HM, et al. [http://www.atsjournals.org/doi/pdf/10.1164/airccm-conference.2017.195.1\\_MeetingAbstracts.A7015](http://www.atsjournals.org/doi/pdf/10.1164/airccm-conference.2017.195.1_MeetingAbstracts.A7015)



# Challenge: New/old microbes

- ▶ Carbapenem-resistant Gram-negatives
- ▶ Arboviruses, e.g., zika
- ▶ *C. difficile*
- ▶ Vancomycin-resistant enterococci, *S. aureus*
- ▶ MERS-CoV
- ▶ *Candida auris*
- ▶ *Mycobacterium chimaera*

Morbidity and Mortality Weekly Report

Investigation of the First Seven Reported Cases of *Candida auris*, a Globally Emerging Invasive, Multidrug-Resistant Fungus — United States, May 2013–August 2016

Invasive cardiovascular infection  
by *Mycobacterium chimaera* potentially associated  
with heater-cooler units used during cardiac surgery

30 April 2015



# Investigations: Intricate Devices: Challenge - Safer Devices

- ▶ 1988
- ▶ Flexible endoscopes
  - ▶ Guidelines for preventing infections

- ▶ 2015
- ▶ Carbapenem-resistant enterobacteriaceae (CRE)
  - ▶ Endoscopic retrograde cholangiopancreatography (ERCP)

- ▶ 2017
  - ▶ Disposables
  - ▶ Swallowables

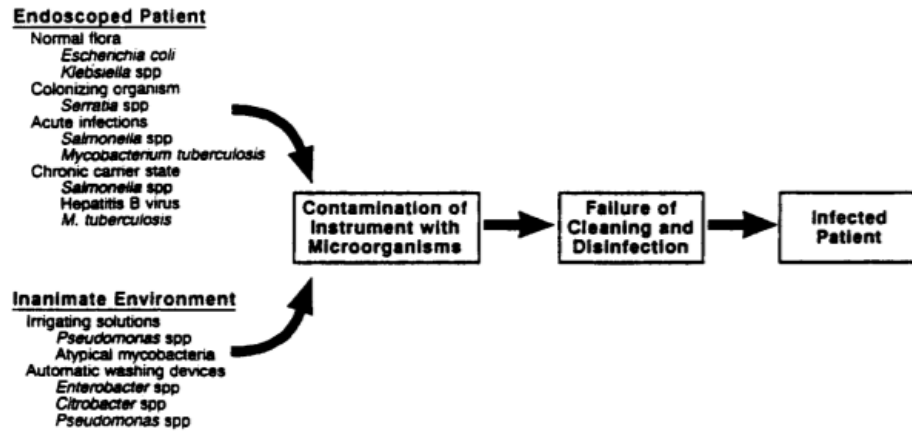


Figure 1: Close-up view of an ERCP endoscope tip.

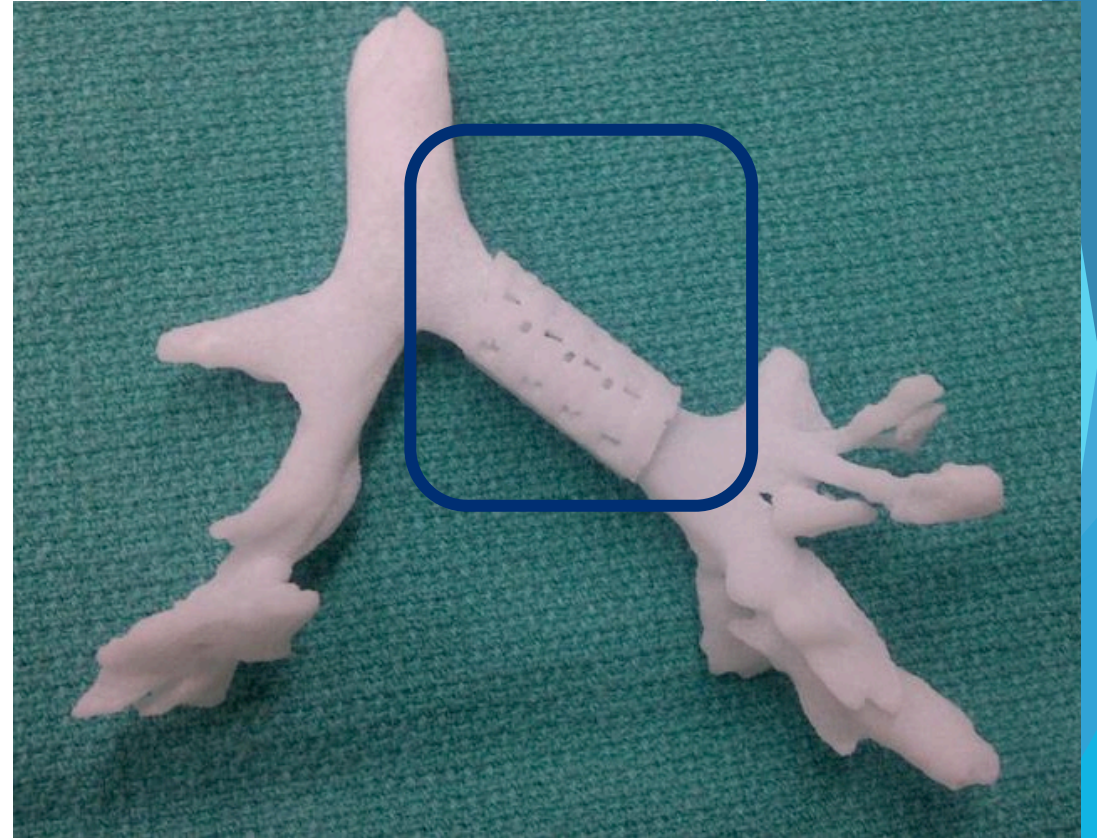


British Society of Gastroenterology. *GUT* 1988; 29: 1134-51.  
Alvarado CJ, Reichelderfer. *Am J Infect Control*; 2000: 138-55.



# Investigations: Invasive devices - Challenge

- ▶ 3D body parts - what are the IPAC issues?
  - ▶ Sterilisation
  - ▶ Biofilm development
  - ▶ Others?



tracheal splint for a 20-month-old patient

# Investigations: Environment



Cleaning, disinfection, testing:

- Should we use these devices?
- How to choose?
- Cost-benefit?



ULTRA-VIOLET  
**ALUVIS**



## ATP TESTING

Our Hygiene products provide the food, life sciences, clinical and other manufacturing industries with rapid, dependable and affordable test platforms.

SHOP ATP TESTING



Tru-D Unit by Lumalier



# Environment

- Copper impregnated surfaces
- Linen treated with silver
- Bactericidal paint
- Paper sanitizers - produce plasma (ionized gas)
- Lighting fixtures



## How It Works:

- The 405nm emitted from Indigo-Clean reflects off of walls and surfaces, penetrating harmful micro-organisms



Data/Lessons Learned from  
Investigations → Guidelines

# 4. UTI Guidelines - USA CDC


Increase in evidence-based guidelines

1981	2009
<p><b>Guideline for prevention of catheter-associated urinary tract infections</b></p> <p><b>Edward S. Wong, M.D.</b> <i>In consultation with Thomas M. Hooton, M.D.</i></p>	<p><b>Guideline for prevention of catheter-associated urinary tract infections</b></p> <p><b>Healthcare IC Practices Advisory Committee</b></p>
<p>6 pages; <b>12</b> recommendations</p>	<p>67 pages; <b>42</b> recommendations</p>
<p>Often based on descriptive studies, outbreak investigations</p>	

Category IA	A strong recommendation supported by high to moderate quality† evidence suggesting net clinical benefits or harms
Category IB	A strong recommendation supported by low quality evidence suggesting net clinical benefits or harms or an accepted practice (e.g., aseptic technique) supported by low to very low quality evidence
Category IC	A strong recommendation required by state or federal regulation.
Category II	A weak recommendation supported by any quality evidence suggesting a trade off between clinical benefits and harms
No recommendation/ unresolved issue	Unresolved issue for which there is low to very low quality evidence with uncertain trade offs between benefits and harms



# Guidelines: Challenge - Which One?



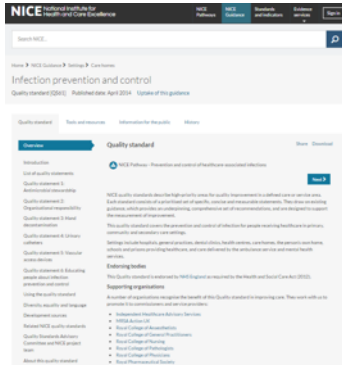
PAHO/CHA/IR/AMR/003-14

Biennial Meeting  
PAHO Technical Advisory Group on Antimicrobial Resistance and Infection Prevention and Control

Final Report

Washington, D.C., 2-3 December 2013

- General Guidelines
- Device-associated Infection Prevention Guidelines
- Procedure-associated Infection Prevention Guidelines
- Drug-resistant Organisms
- Healthcare Personnel
- Protecting Healthcare Personnel from HIV



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Infectious Diseases > The Canadian Nosocomial Infection Surveillance Program > Infection Control Guideline Series

**Nosocomial and Occupational Infections**

**Infection Control Guideline Series**

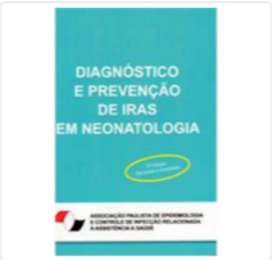
- Infection Prevention and Control Guidance for Middle East Respiratory Syndrome Coronavirus (MERS-CoV) in Acute Care Settings (2014)
- Infection Prevention and Control Expert Working Group: Advice on Infection Prevention and Control Measures for Ebola Virus Disease in Healthcare Settings (2015)
- Infection Prevention and Control Expert Working Group: Advice on the Management of Ebola Virus Disease-associated Waste in Canadian Healthcare Settings (2015)
- Infection Prevention and Control Guidelines - Critical Appraisal Toolkit (2014)
- Canadian Tuberculosis Standards 7th Edition: Chapter 18 - Prevention and Control of Tuberculosis Transmission in Health Care and Other Settings (2014)
- Routine Practices and Additional Precautions for Prevention the Transmission of Infection in Healthcare Settings (2013)
  - Poster: Help reduce the spread of antimicrobial resistance - Follow recommendations for routine practices in settings where health care is provided (2016)
  - Routine Practices and Additional Precautions Assessment and Educational Tools (2013)
- Clostridium Difficile Infection - Infection Prevention and Control Guidance for Management in Long-term Care Facilities (2013)
- Clostridium Difficile Infection - Infection Prevention and Control Guidance for Management in Acute Care Settings (2013)
- Seasonal Influenza - Infection Prevention and Control Guidance for Management in Home Care Settings (2012)
- Hand Hygiene Practices in Healthcare Settings (2012)
- Infection Prevention and Control Guideline for Flexible Gastrointestinal Endoscopy and Flexible Bronchoscopy (2011)
  - NOTICE: Recommended practices for the prevention of endoscopy-related infections (2016)
- Guidance: Infection Prevention and Control Measures for Healthcare Workers in Acute Care and Long-term Care Settings for Seasonal Influenza (2010)
- Guidance: Infection Prevention and Control Measures for Healthcare Workers in All Healthcare Settings - Carbapenem-resistant Gram-negative Bacilli (2010)
- Infection Prevention and Control Guidelines for the Prevention of Healthcare-Associated Pneumonia (2010)
- Classic Creutzfeldt-Jakob Disease in Canada - Quick Reference Guide (2007)
- Classic Creutzfeldt-Jakob Disease in Canada (2007) ©
- Prevention and Control of Occupational Infections in Health Care (2002) ©

SPECIAL ARTICLES

## American College of Surgeons and Surgical Infection Society: Surgical Site Infection Guidelines, 2016 Update



Precautions and isolation - 2nd edition revised and expanded



Diagnosis and Prevention of HAI in Neonatology



How to set up a hospital infection control program - reprinting



Hygiene, Environmental and Solid Waste Disinfection in Health Services.

# Guidelines - Challenge: Keeping current

- ▶ Literature Search
  - ▶ Surgical site/wound infection & Infection prevention
  - ▶ 2000-2015 [human only]
  - ▶ 964 articles

JAMA Surgery | Special Communication

## Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017

<http://jamanetwork.com/journals/jamasurgery/fullarticle/2623725>

Vol. 20 No. 4

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY

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## GUIDELINE FOR PREVENTION OF SURGICAL SITE INFECTION, 1999

Alicia J. Mangram, MD; Teresa C. Horan, MPH, CIC; Michele L. Pearson, MD; Leah Christine Silver, BS; William R. Jarvis, MD;  
The Hospital Infection Control Practices Advisory Committee



Guidelines → Prevention Interventions



# 5. Interventions - Challenge

1. Educating and training re: insertion and manipulation
2. Checklist for each CVC insertion
  - A. use of maximal sterile barriers
  - B. hand hygiene
  - C. insertion site disinfection and antisepsis
  - D. choice of catheter insertion site
  - E. number of puncture attempts
3. Replacing catheters when asepsis cannot be ensured
4. Avoiding regular replacement of catheters
5. Adopting a puncture kit to obtain central access
6. Changing venous access dressings routinely
7. Reassessing its need on a daily basis

**BSI Bundle: from guidelines**

**How to educate to make sure all components always addressed?**

# Intervention: Challenge (gap between evidence and practice)

## Implementation Science

- ▶ Promote the systematic uptake of research findings and other evidence-based practices into routine practice
- ▶ Can adopt a practice into policy; need to make sure it is being followed (i.e., implemented)

At the heart of translational research is translating an idea from research into practice, going from the concept to the proof of the principle and then moving principle into practice in the real-world setting of healthcare.

David Henderson  
5<sup>th</sup> decennial conference, 2010



# Interventions: Challenge - New Ideas Needed

- ▶ Breakthrough Collaborative Series (BTS) approach
  - ▶ There is a gap between what we know and what we do
- ▶ BTS brings together a large number of teams to seek improvement in a focused topic area

- ▶ Antimicrobial stewardship smartphone app
  - ▶ Increase adherence to guidelines

Markley JD, et al. *Am J Infect Control* 2017; 45: 317-320

## The Breakthrough Series: IHI's Collaborative Model for Achieving Breakthrough Improvement

<http://www.ihl.org/resources/Pages/IHIWhitePapers/TheBreakthroughSeriesIHICollaborativeModelforAchievingBreakthroughImprovement.aspx>

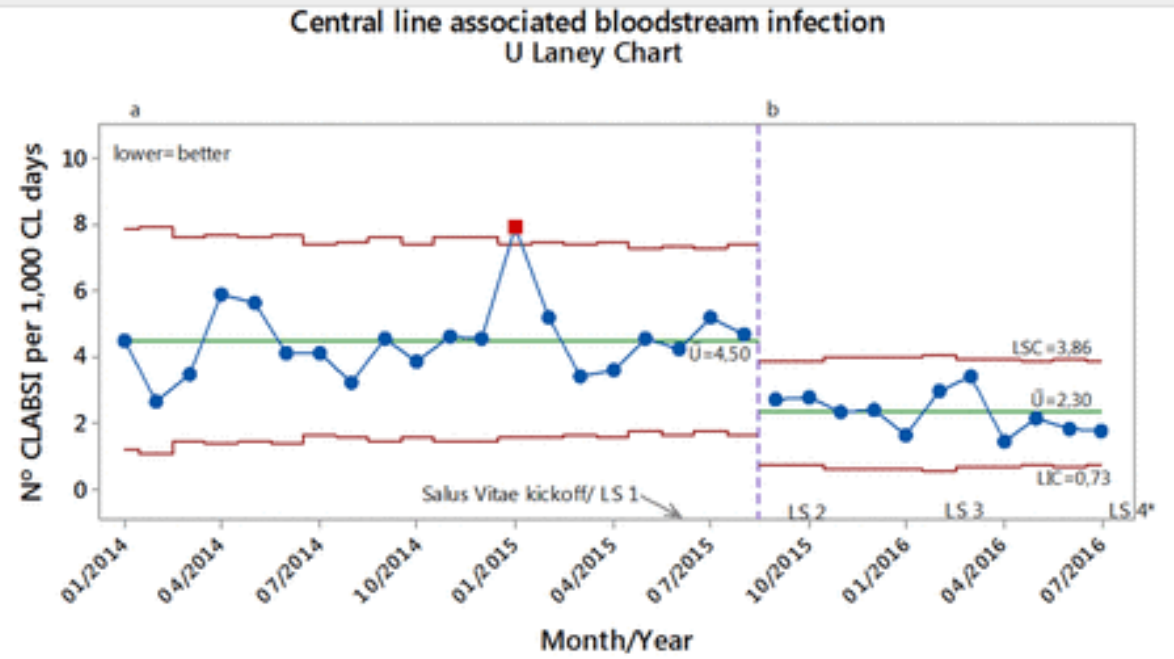


## Abstracts

719

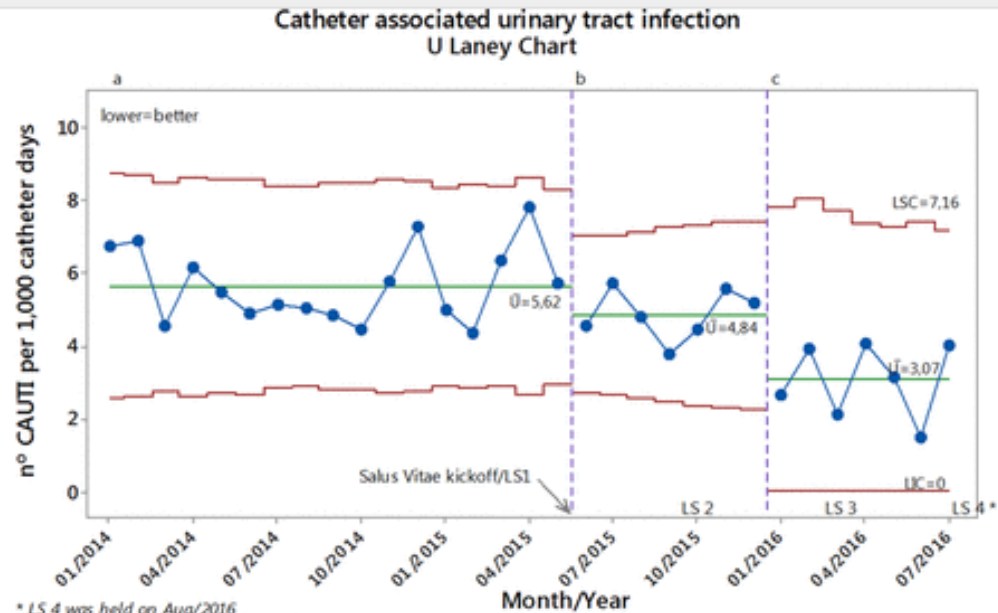
# EFFECTIVENESS OF A COLLABORATIVE APPROACH IN REDUCING HEALTHCARE-ASSOCIATED INFECTIONS AND IMPROVING SAFETY IN BRAZILIAN ICUS: THE SALUS VITAE STORY

Camila Lajolo<sup>1</sup>, Camila Sardenberg<sup>1</sup>, Kevin Rooney<sup>2</sup>, Ademir Petenate<sup>3</sup>, Paulo Borem<sup>4</sup>, Katharine Luther<sup>5</sup>



\* LS 4 was held on Aug/2016

Average N teams reporting per month 12/13 (92%), range 11-13. Tests performed with unequal sample sizes



\* LS 4 was held on Aug/2016

Tests performed with unequal sample sizes

Average N teams reporting per month 12/13 (92%), range 11-13

## Promoted

- Adoption of bundles
- Leadership engagement

Identified gaps in staffing, knowledge



# Changing Behaviour

- ▶ REO Williams, 1970 International Conference on Nosocomial Infections
  - ▶ We could devise any number of elaborate preventive measures, but, even if money were unlimited, the ability of hospital personnel to observe a plethora of precautions is limited, no matter how vigorous the admonition of the Hospital Infection Committee.

Sir Robert Evan Owen Williams - a Welsh pathologist. His research on HAIs started in the 1940s.



# Changing Behaviour - Challenge

- ▶ 2015 survey of 3,400 ICU physician and nurse staff in 95 countries

Survey Evaluation	Middle income countries	High income countries
1. Written guideline for BSI prevention available	80%	81%
2. Compliance with central line insertion bundle	23%	60%
3. Daily assessment of central line	60%	73%

Valencia C, et al. *Antimicrobial Resist & Infect Control* 2016; 5:49



# Changing behaviour

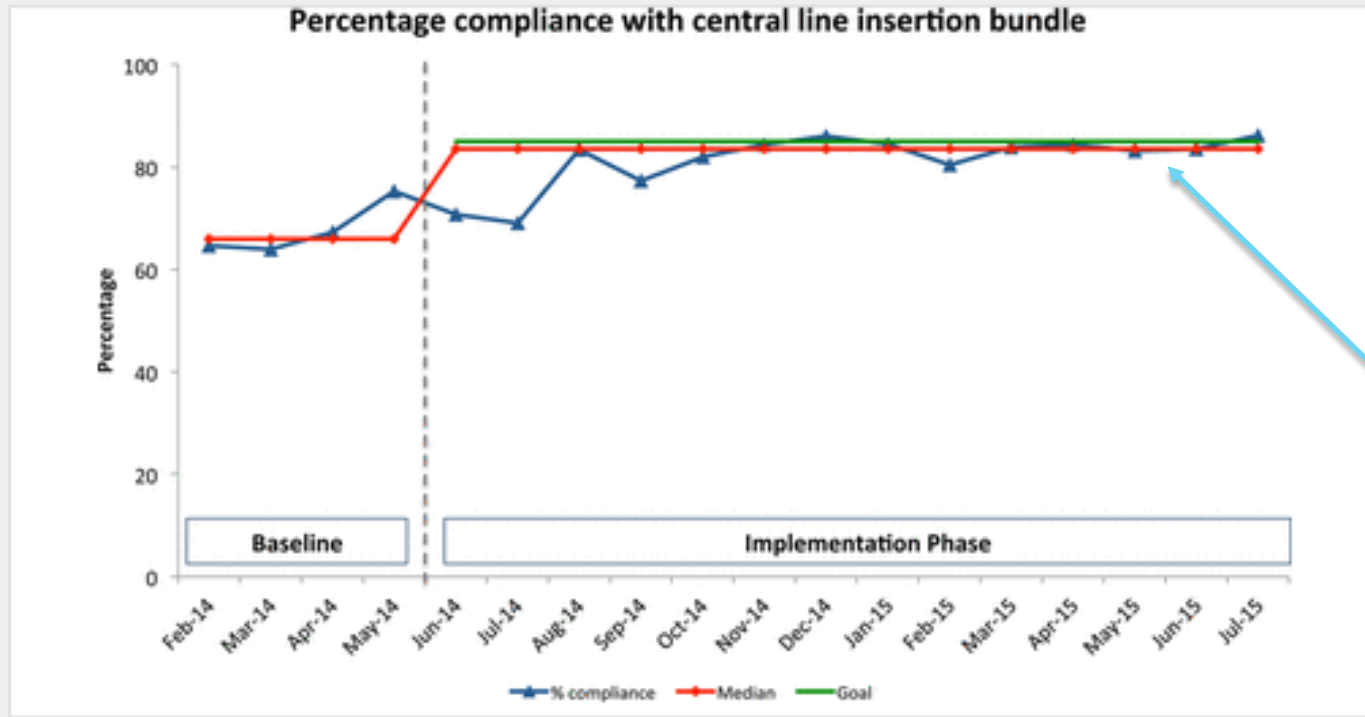
## Abstracts

823

### IMPROVING PATIENT SAFETY IN LATIN AMERICA: A MULTI-COUNTRY QUALITY IMPROVEMENT COLLABORATIVE PROJECT TO REDUCE THE INCIDENCE OF CLABSI IN ICUS

Jafet Arrieta<sup>1</sup>, Marcela Colmenares<sup>2</sup>, Pedro Delgado<sup>3</sup>, Ezequiel Garcia-Elorrio<sup>4</sup>, Carolina Giuffre<sup>5</sup>, Dolores Macchiavello<sup>6</sup>, Nuria Mora<sup>7</sup>, Carola Orrego<sup>7</sup>, Viviana Rodriguez<sup>7</sup>

Figure 1



Reduced CLABSI incidence 26%

Only 86% compliance at end of study



## 6. Program/Practitioners - Change brings Challenge

Activity	1970-1990	2016
Scope of Program	Focus on infectious disease events	Focus on range of safety outcomes: antimicrobial prophylaxis, pandemic planning
Data Collection	Daily review of labs, chart review	Data mining of medical record, flagging of possible HAIs
Outbreak Investigation	Basic epidemiology	Molecular epidemiology

Bryant KA, et al. *Infect Control Hosp Epidemiol* 2016; 37 (4): 371-380





# Program/Practitioners - Competency Challenge



Revista da Escola de Enfermagem da USP  
Print version ISSN 0080-6234 On-line version ISSN 1980-220X

Rev. esc. enferm. USP vol.49 no.spe São Paulo Dec. 2015

<http://dx.doi.org/10.1590/S0080-623420150000700010>

ORIGINAL ARTICLE

## Evaluation of Programs of Infection Control related to Healthcare Assistance in Hospitals\*

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<sup>2</sup>Universidade Estadual do Oeste do Paraná, Toledo, PR, Brazil.

<sup>3</sup>Universidade de São Paulo, Escola de Enfermagem, Departamento de Enfermagem Médico-Cirúrgica, São Paulo, SP, Brazil.

Rev Saude Publica 2014 Oct; 48(6): 965-1001  
doi: 10.1590/S0034-8919.2014048004925

PMCID: PMC4265333

Language: English | Portuguese

### Infeções relacionadas à assistência à saúde: desafios para a saúde pública no Brasil

Maria Clara Pastovize\* and Carlos Magno Castelo Branco Fortaleza\*\*

\*Correspondence: Maria Clara Pastovize, Escola de Enfermagem - USP, Rua Dr. Enéas de Carvalho Aguiar, 419 Cerqueira César, 05403-000 São Paulo, SP, Brasil. E-mail: pastovize@usp.br  
The authors declare no conflict of interest.

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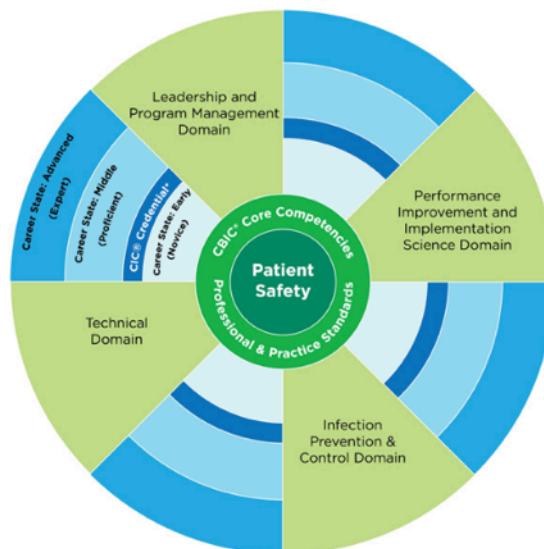
#### Abstract

Objetivou-se apresentar os principais marcos históricos e regulatórios da prevenção das infecções relacionadas à assistência em saúde, a magnitude do problema no Brasil e uma visão crítica sobre os desafios e necessidades para sua prevenção no País. Assim, foi desenvolvida narrativa crítica sobre infecções relacionadas à assistência à saúde quanto aos elementos normativos e administrativos da prevenção, da magnitude do fenômeno, apontando desafios para o controle de tais infecções no Brasil. São discutidos aspectos históricos do controle de infecções relacionadas à assistência à saúde, as dificuldades impostas pelas características do sistema de saúde e dimensões geográficas do País, as limitações de suporte laboratorial, custos, cultura institucional, capacitação de profissionais e engajamento dos pacientes. Considerou-se premente haver discussão nacional sobre o tema por meio do diálogo entre os segmentos da representação governamental, das instituições, dos trabalhadores e usuários do sistema de saúde, para superação desses desafios.

## Requirements for Infrastructure and Essential Activities of Infection Control and Epidemiology in Hospitals: A Consensus Panel Report

William E. Scheckler, MD; Dennis Brimhall; Alfred S. Buck, MD; Barry M. Farr, MD; Candace Friedman, MPH, CIC; Richard A. Garibaldi, MD; Peter A. Gross, MD; Jo-Ann Harris, MD; Walter J. Hierholzer, Jr, MD; William J. Martone, MD; Linda L. McDonald, RN, MSPH, CIC; Steven L. Solomon, MD

### APIC Competency Model for the Infection Preventionist



## AIC special communications

### APIC/CHICA-Canada infection prevention, control, and epidemiology: Professional and practice standards

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# Program/Practitioners: Challenge - Time/Knowledge

## Two new categories in 2015

**Table 3.** Overview of examination specifications

Content domain	Item	RE-AP-AN*
Identification of infectious disease processes	18	5-10-3
Surveillance and epidemiologic investigation	38	9-23-6
Preventing/controlling the transmission of infectious agents	39	9-24-6
Employee/occupational health	10	2-6-2
Management and communication (leadership)	16	4-9-3
Education and research	14	4-9-1
<b>Total</b>	<b>135</b>	<b>33-81-21</b>

\*The number of items requiring recall, application, and analysis, respectively.

Table 3.  
Test specification content areas, certification in infection control

Category	No. of items (questions)
Identification of infectious disease processes	22
Surveillance and epidemiologic investigation	24
Preventing and controlling the transmission of infectious agents	25
Employee and occupational health	11
Management and communication	13
Education and research	11
Environment of care	14
Cleaning, sterilization, disinfection, and asepsis	15

NOTE. There are 135 questions, including cognitive levels (20%), recall (60%), and application (20%) analysis.

*Am J Infect Control:*  
Feltovich F, et al. 2010;38: 784-788  
Henman LJ, et al. 2015; 43: 664-668



# The Future?

Prediction is very difficult - especially if it's about the future.

- Danish physicist Niels Bohr



# 6 Areas of Change (and Opportunity) for IPAC

1. Patient type changes
2. Remote monitoring
3. Social media
4. Targeted treatment
5. Consumer awareness
6. Global disease



# 1. Patient type changes

## Shift to ambulatory/community care

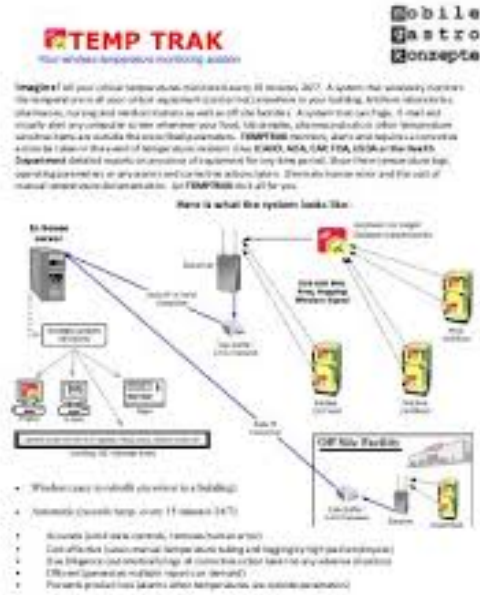
- a. Increasing lifespan
- b. Sicker, more vulnerable patients left in hospital
- c. All hospital beds become more like intensive care
- d. Short hospital stay with 'early' discharge
  - Caring for patients in home/rehab
  - Post-hospital surveillance
- e. Transfer of microbes between settings



# 2. Remote Monitoring



Hand hygiene tracking  
Refrigerator monitoring  
Video-monitoring  
Next??



L.A. Sánchez-Carrillo et al. / American Journal of Infection Control 44 (2016) 868-72

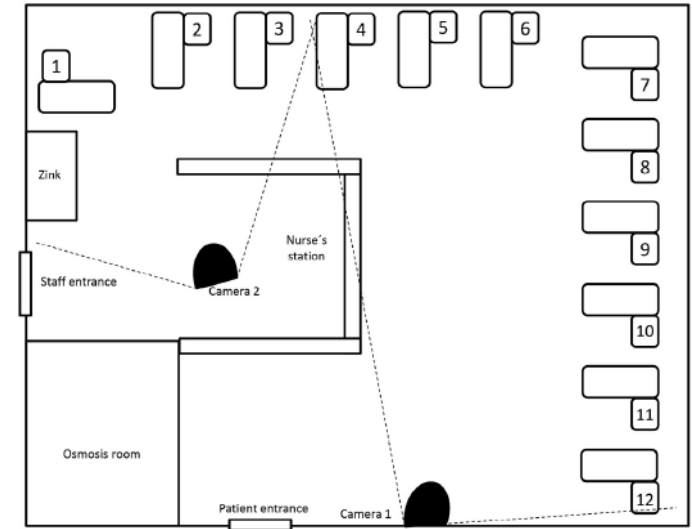
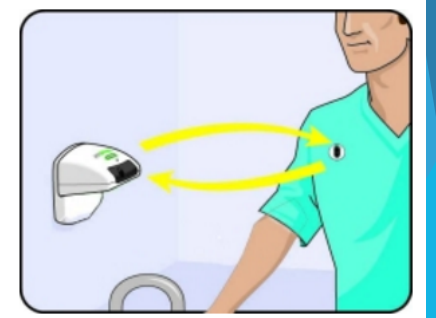
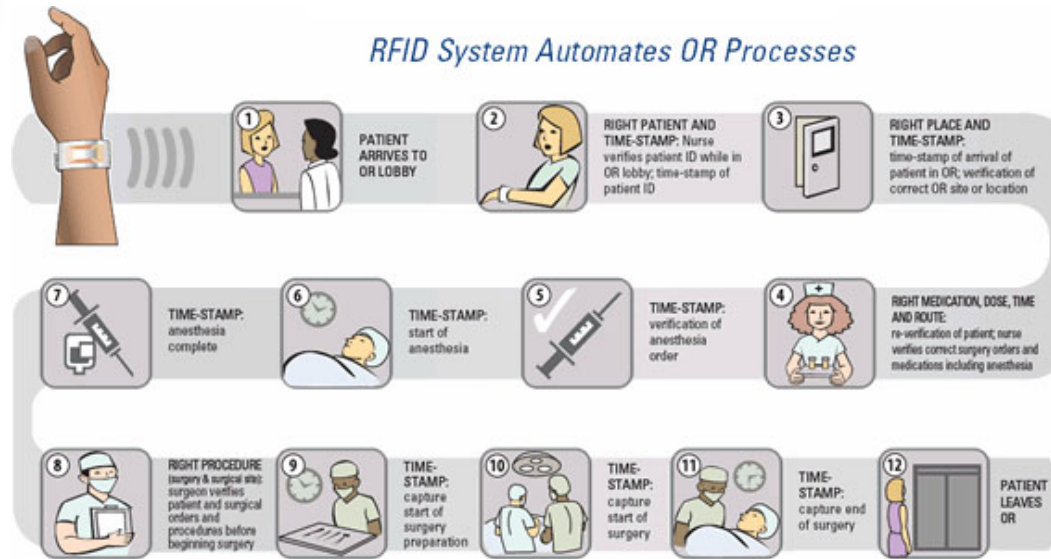
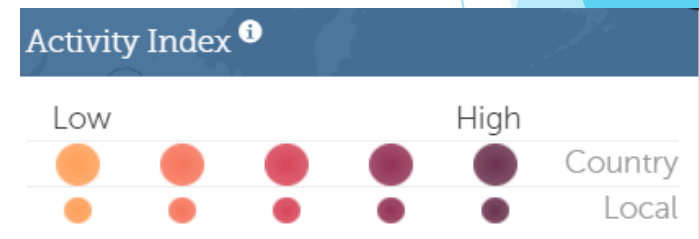
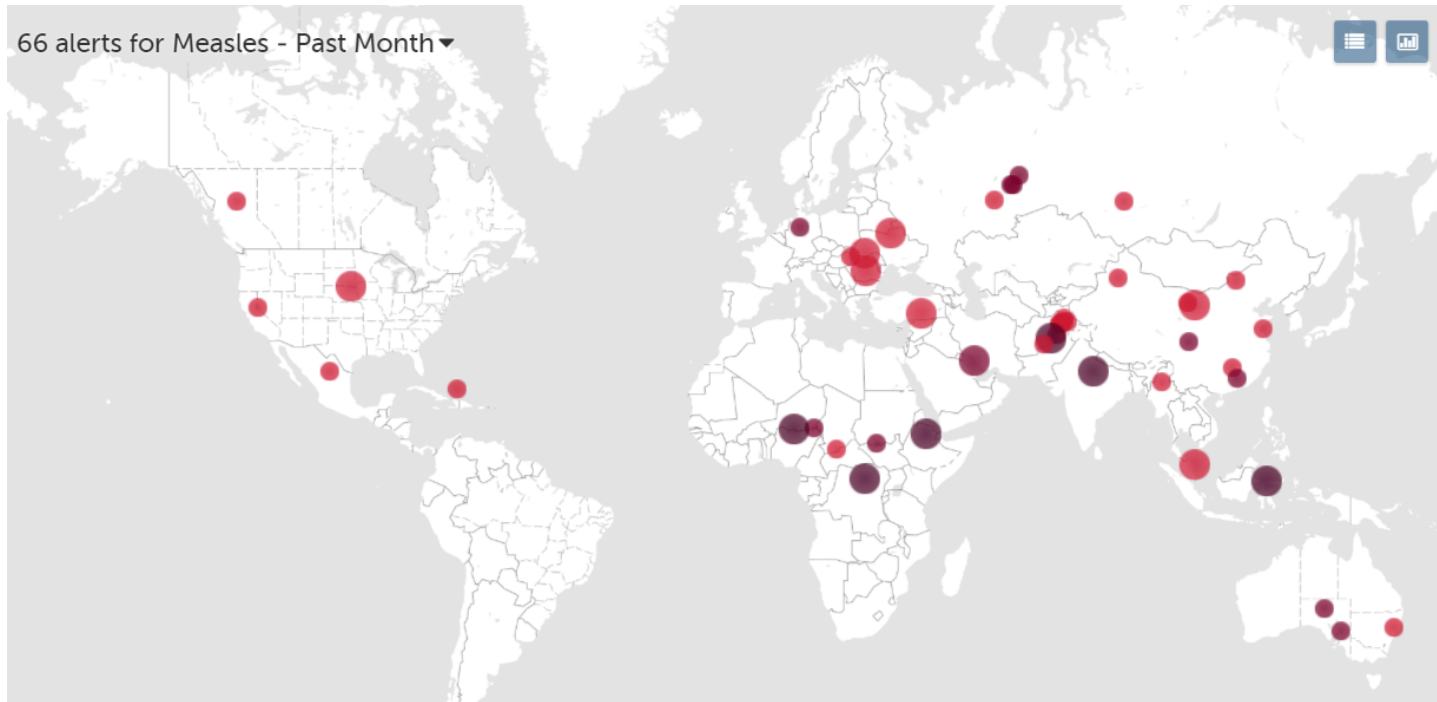


Fig 1. Schematic distribution of the number of beds in the hemodialysis units and the camera's visual field for hand hygiene compliance monitoring.



# 3. Social Media and Forecasting

- ▶ Digital Disease Detection: Using Social Media To Predict Flu Trends
  - ▶ Researchers Use Twitter to Predict Flu Outbreaks
- ▶ HealthMap - <http://www.healthmap.org/site/about>



# Social Media & Us

## Ebola and the social media

*Lancet* 2014; 384: 2207

*J. Pisano et al. / American Journal of Infection Control 44 (2016) 1231-6*

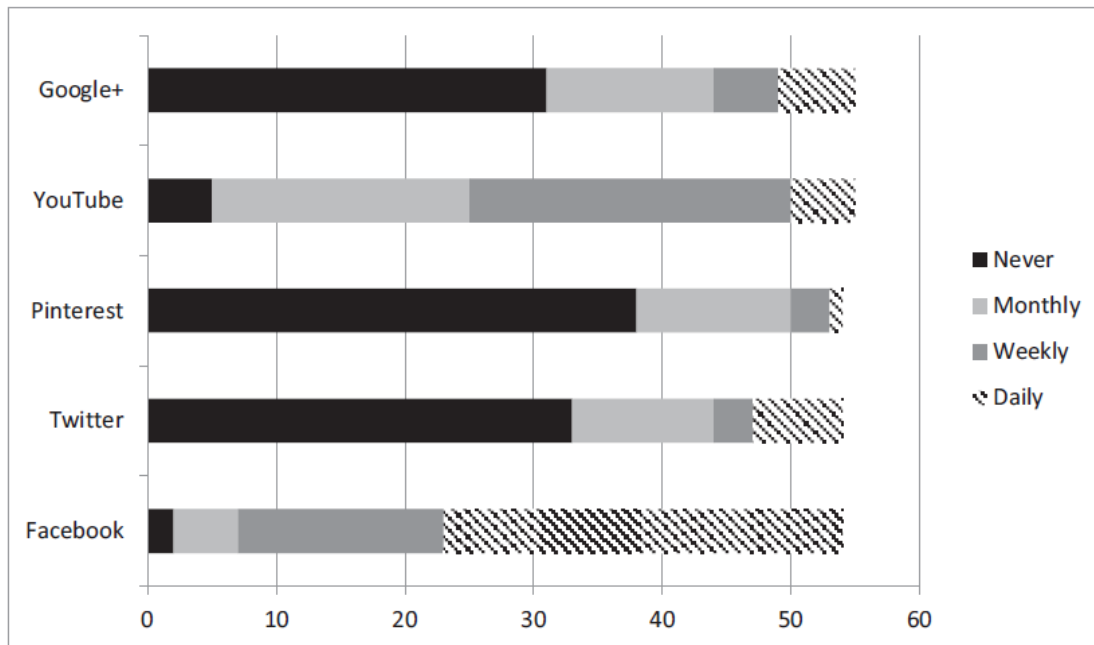


Fig 1. Frequency of social media usage by internal medicine residents by platform. Presurvey data reported from 55 respondents.

Identifying the public's concerns and the Centers for Disease Control and Prevention's reactions during a health crisis: An analysis of a Zika live Twitter chat

*Am J Infect Control* 2016;44: 1709-1711

## Twitter: A Good Place to Detect Health Conditions

*PLOS One* 2014. <http://dx.doi.org/10.1371/journal.pone.0086191>

Could Twitter be the key to cracking the flu?

A team from Northeastern University developed a new model to predict the spread of the flu in real time using Twitter (TWTR, Tech30).

<http://money.cnn.com/2017/05/11/technology/tracking-flu-twitter/>

Workers 18-29 years of age:  
83% of Facebook users  
27% of Twitter users

Can use social media to  
teach workers





# 4. Targeted treatment

Scientists at the University of Houston made nanodiscs from gold nanoparticles and used them to kill bacteria, a method that could one day help doctors to treat some common infections without antibiotics.

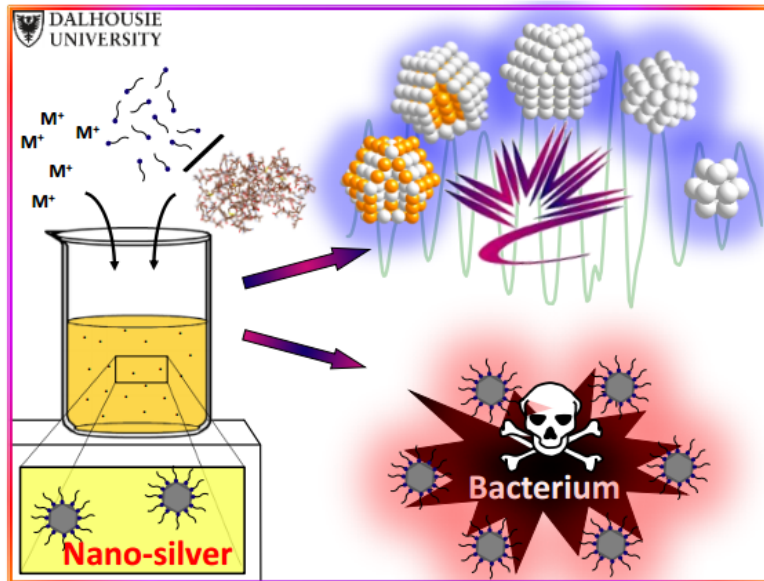
**The qUTI system**  
Astrego Diagnostics develops the qUTI system to rapidly and accurately diagnose UTI and determine antibiotic susceptibility at the point of care.

## Nanosilver: Naughty or nice?

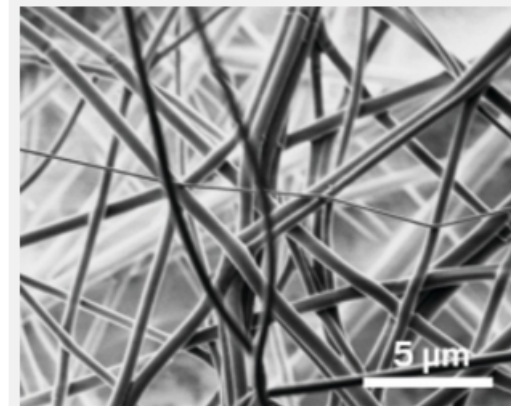
Questions abound about the possible effects of those tiny antibiotic particles that are showing up all over

### Nanosilver and the future of antibiotics

May 27, 2015 by Mark Ferguson



The atomic structure of nanosilver, revealed by synchrotron X-ray spectroscopy, is proving to be a determinant of silver's antibacterial activity. Credit: Padmos, J. Daniel, et al.



Electrospun fibers containing a peptide that blocks bacterial quorum sensing prevent *Staphylococcus aureus* from activating its infectious pathways.

Credit: *ACS Infect. Dis.*



# 5. Consumer Awareness

- ▶ Continued demand for data
  - ▶ How to address inter-hospital comparisons
  - ▶ Improved risk adjustment
- ▶ Pressure to eliminate adverse events will increase
  - ▶ More research needed
    - ▶ Device & non-device related HAIs
    - ▶ Changing behavior of healthcare workers
- ▶ Antibiotic use and resistance



# 6. Global Movement

- ▶ Medical treatment in other countries/travel
  - ▶ Antibiotic resistance
- ▶ Refugees
  - ▶ Local diseases brought to non-local areas
- ▶ Vector spread
- ▶ Disease transfer from animals



Volume 38, Issue 2 February 2017, pp. 254-257

## A Silent Epidemic of Colistin- and Carbapenem-Resistant Enterobacteriaceae at a Turkish University Hospital

Gökhan Metan <sup>(a1) (a2)</sup>, Ahmet Ilbay <sup>(a3)</sup>, Ozgen Koseoglu Eser <sup>(a4)</sup>, Serhat Unal <sup>(a1) (a2)</sup> ... 

DOI: <https://doi.org/10.1017/ice.2016.255> Published online: 05 December 2016

Volume 38, Issue 2 February 2017, pp. 252-254

## Emergence of OXA-72-producing *Acinetobacter baumannii* Belonging to High-Risk Clones (CC15 and CC79) in Different Brazilian States

Mariana Pagano <sup>(a1) (a2)</sup>, Lisiane Rocha <sup>(a2) (a3)</sup>, Jorge L. M. Sampaio <sup>(a3)</sup>, Andreza F. Martins <sup>(a2) (a4)</sup> ... 

DOI: <https://doi.org/10.1017/ice.2016.287> Published online: 06 December 2016

WHO list of priority pathogens - [http://www.who.int/csr/research-and-development/list\\_of\\_pathogens/en/](http://www.who.int/csr/research-and-development/list_of_pathogens/en/)



# Professional Societies - Our Challenge

- ▶ WHO Global Survey - 2015
  - ▶ 133 countries responded
  - ▶ Only 29% reported IPAC programs in tertiary hospitals
- ▶ Survey of SSIs in Brazil's small hospitals
  - ▶ Incidence 8.1%



[http://apps.who.int/iris/bitstream/10665/163468/1/9789241564946\\_eng.pdf?ua=1&ua=1](http://apps.who.int/iris/bitstream/10665/163468/1/9789241564946_eng.pdf?ua=1&ua=1)

Armede VCB, et al. *Am J Infect Control* 2017;45: 935-8.



# Change is the constant that links our past to our future.

- ▶ Julie Gerberding
  - ▶ Former Director of the USA's CDC
- ▶ 2010 Decennial Conference on HAIs

# The future depends on our willingness to explore new frontiers and to pursue new challenges and opportunities.

- ▶ Elizabeth Pantelick
  - ▶ APIC Carole deMille Lecture, 1985

*Infect Control Hosp Epidemiol* 2010; 31: S73-S75; *Am J Infect Control* 1989; 2: 56-61



# Professor Graham Ayliffe

- ▶ IPAC Pioneer
- ▶ Emeritus professor of medical microbiology  
University of Birmingham, UK
- ▶ Founding member of Hospital Infections Society
- ▶ On first IFIC Board; IFIC chair 1993-1996
- ▶ Passed away 22 May 2017





