Catheter-Associated Urinary Tract Infections (CAUTI): A partnership in care

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Why CAUTI?

- Most common type of device associated healthcare-associated infection
- – > 30% of HAIs reported to NHSN
- Increased morbidity & mortality
  – Estimated 13,000 attributable deaths annually
  – Leading cause of secondary BSI with ~10% mortality
- Excess length of stay–2-4 days
- Unnecessary antimicrobial use

What is CAUTI?

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Invasive Device

In Scope:

Foley catheters

Out of Scope: Nephrostomies, Super-pubic catheters, Condom catheters, Ileoconduits and In-Out catheters

CDC (2015) criteria

At least one of the following signs or symptoms with no other recognised cause;
Fever (>38 °C)
Suprapubic tenderness
Costovertebral pain and tenderness
AND
Urine culture ≥ 10^5 cfu/ml with no more than two species of microorganisms
Or
Urine culture with ≥10^3 and ≤ 10^5 cfu/ml with no more than two species and:
Positive urinalysis (dipstick or unspun urine or microscopy)
Micro-organisms on Gram stain of unspun urine.

Revised McGreer (2012) Stone *et al*

At least one of the following;

- Fever, rigors, or new-onset hypotension with no alternative site
- Acute change in mental status or acute functional decline with no alternate diagnosis and leukocytosis
- New onset suprapubic pain or costovertebral pain or tenderness
- Purulent discharge from around the catheter or acute pain, swelling or tenderness of the testes, epididymis or prostate

AND
Urinary catheter specimen with ≥ 10^5 cfu/ml of any organism(s)

Catheter Complications

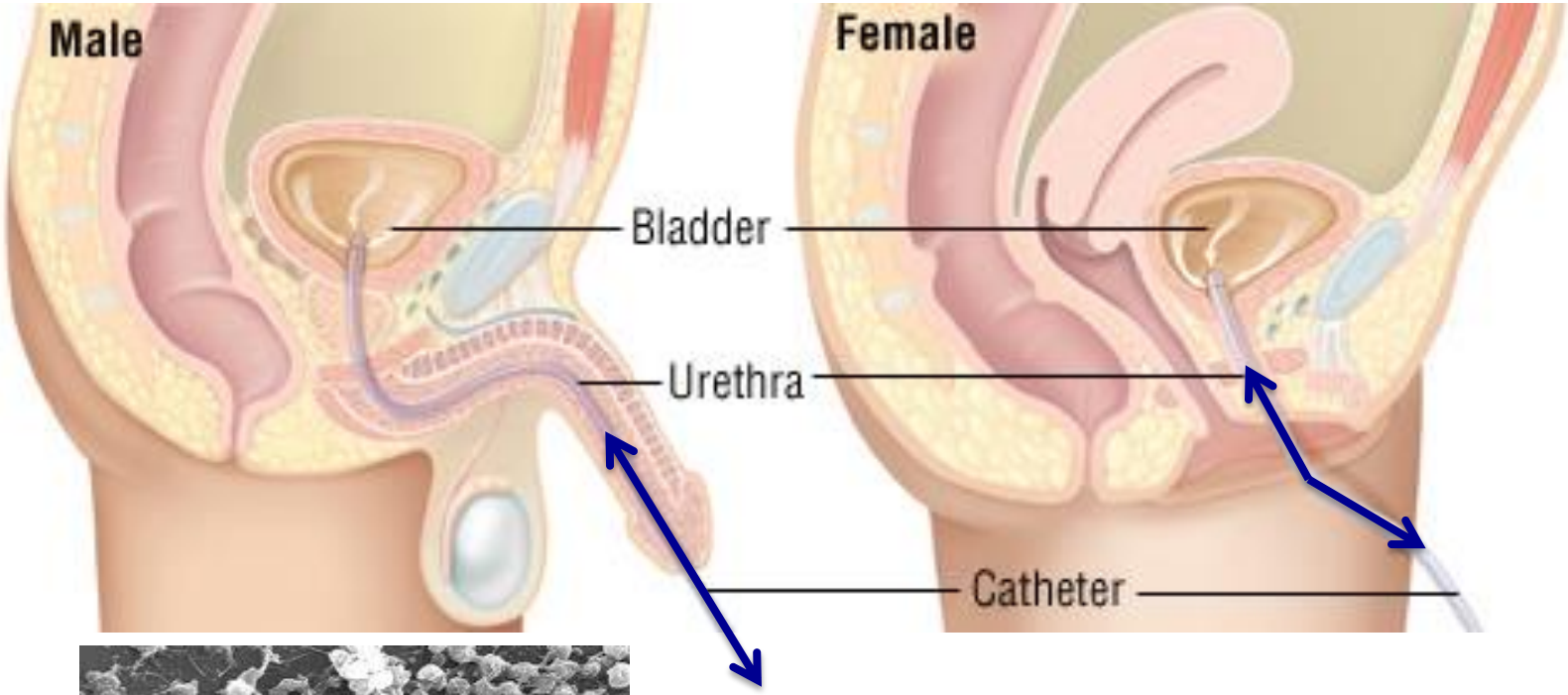
Other complications:

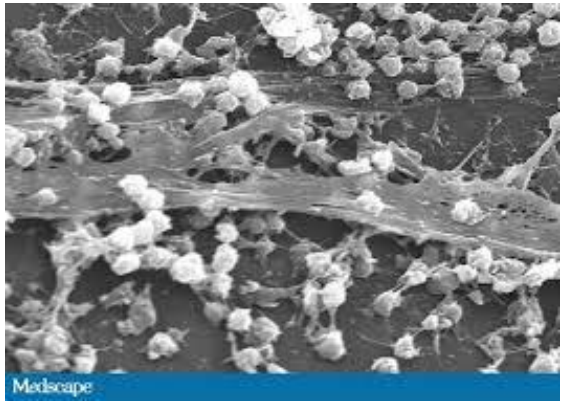
- Non-bacterial urethral inflammation
- Urethral strictures
- Mechanical trauma
- Catheter blockage
- Prostatitis

Other complications:

- Prostatic abscess
- Penile ulceration
- Mobility impairment

CAUTI Aetiology





Biofilm forms along the catheter and becomes colonised within 7 to 10 days.

Types of CAUTI

Short Term 0 to 4 days	Medium Term 5 to 29 days	Long Term 30+ days	
3% to 7% bacteriuria per day		100% bacteriuria by day 30	
Single organism most common *E.coli*	Polymicrobial and resistant to many antibiotics; *P. aeruginosa*, other Enterobacteriaceae, Enterococcus spp., yeast spp., *S.aureus*, *Proteus mirabilis, Morganella morganii* and Providencia		**Causative Organism**
Non complex lower urinary tract pathology	Trauma, bladder injury/perforation, urologic surgical procedures and urinary retention/obstruction	Neurogenic bladder dysfunction associated with conditions as multiple sclerosis, stroke and spinal cord injury	**Length of insertion Indicator**
Acute Healthcare	Acute Healthcare and Community	Aged/Residential Care and Community	**Setting**

Anti-biogram

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Antimicrobial Stewardship

WHOLE HOSPITAL GRAM NEGATIVE URINE ISOLATES, Jan to June 2015

Medications	Data	Acinetobacter baumannii complex	Citrobacter freundii complex	Citrobacter koseri	Escherichia coli	Escherichia coli ESBL +ve	Enterobacter aerogenes	Enterobacter cloacae/asburiae	Klebsiella pneumoniae	pneumoniae ESBL +ve	Morganella morganii	Pseudomonas aeruginosa	Proteus mirabilis	Serratia marcescens	Stenotrophomonas maltophilia	Klebsiella Raoultella species
Times isolated		**9**	**27**	**25**	**1004**	**84**	**29**	**62**	**194**	**19**	**39**	**140**	**148**	**19**	**6**	**53**
Amoxycillin	%			0	49	0			0	0	0		83			0
	n			25	979	84			194	19	1		147			47
Amoxycillin-clavulanate	%			100	76	44			89	26	0		97			81
	n			25	1003	84			194	19	1		148			53
Ceftazidime	%											95				
	n											139				
Cefazolin	%			100	84	0			88	0			97			56
	n			24	870	77			170	19			130			45
Ciprofloxacin	%	78	93	100	89	26	100	95	96	74	90	86	97	100		91
	n	9	27	25	1004	84	29	62	194	19	39	140	148	19		53
Ceftriaxone	%			100	92	0			91	0			99			92
	n			25	1004	84			194	19			148			53
Cefazolin Urine	%			100	84	0			100		0		94			75
	n			1	133	11			24		1		18			8
Fosfomycin	%					100										
	n					4										
Gentamicin	%	100	93	100	93	60	100	95	95	42	92	97	97	100		98
	n	9	27	25	1004	84	29	62	192	19	39	139	148	19		53
Meropenem	%	100	100	100	100	100	100	97	99	100	100	94	100	100		98
	n	9	27	25	1004	84	29	61	193	19	39	140	148	19		53
Nitrofurantoin	%		85	40	90	82	3	18	14	5	0	0	0	0		57
	n		27	25	1004	84	29	62	194	19	38	138	148	19		53
Norfloxacin	%		96	100	89	26	100	95	95	74	92	88	98	100		96
	n		27	25	1004	84	29	62	194	19	38	138	148	19		53
Cotrimoxazole	%	100	85	96	73	31	100	89	80	5	77	0	80	100	100	92
	n	9	27	25	1004	84	29	61	194	19	39	138	148	19	6	53
Piperacillin-tazobactam	%	100		100	93	92			95	74	100	90	100			89
	n	9		24	1001	84			194	19	1	140	148			53
Trimethoprim	%		85	96	72	31	100	81	76	5	76	0	76	95		92
	n		27	25	1004	84	29	62	194	19	38	139	148	19		53

Acknowledge: Catherine George, antimicrobial stewardship pharmacist at RMH.

Measuring CAUTI

Identify patients or units in which to conduct surveillance risk assessment;

- Microbiology data
- Point prevalence
- Targeted surveillance program

Surveillance

- Use recognised definitions
- Report as catheter days or patient days
- Risk stratifying data based on catheter types

CAUTI Risk Assessment

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Risk Assessment

	Controlled Event	Semi- Controlled Event	Uncontrolled Event
Simple Procedure +/- Semi-Critical Invasive Device, e.g. Endo-tracheal tube insertion or management, small wound dressing	LOW	MEDIUM / HIGH	HIGH
Simple Procedure +/- Critical Invasive Device, e.g. Peripheral IV line insertion, phlebotomy, IV medication administration, IDC care/management, PEG tube maintenance	LOW	MEDIUM / HIGH	HIGH - VERY HIGH
Complex Procedure +/- Semi-Critical Invasive Device, e.g. endoscopic procedures, TOE	LOW	MEDIUM / HIGH	HIGH
Complex Procedure +/- Critical Invasive Device, e.g. CVC insertion, tracheostomy tube insertion, PEG tube insertion, management of free vascular flaps, pedicled flaps	MEDIUM	HIGH - VERY HIGH	VERY HIGH - EXTREME

Preventing CAUTI

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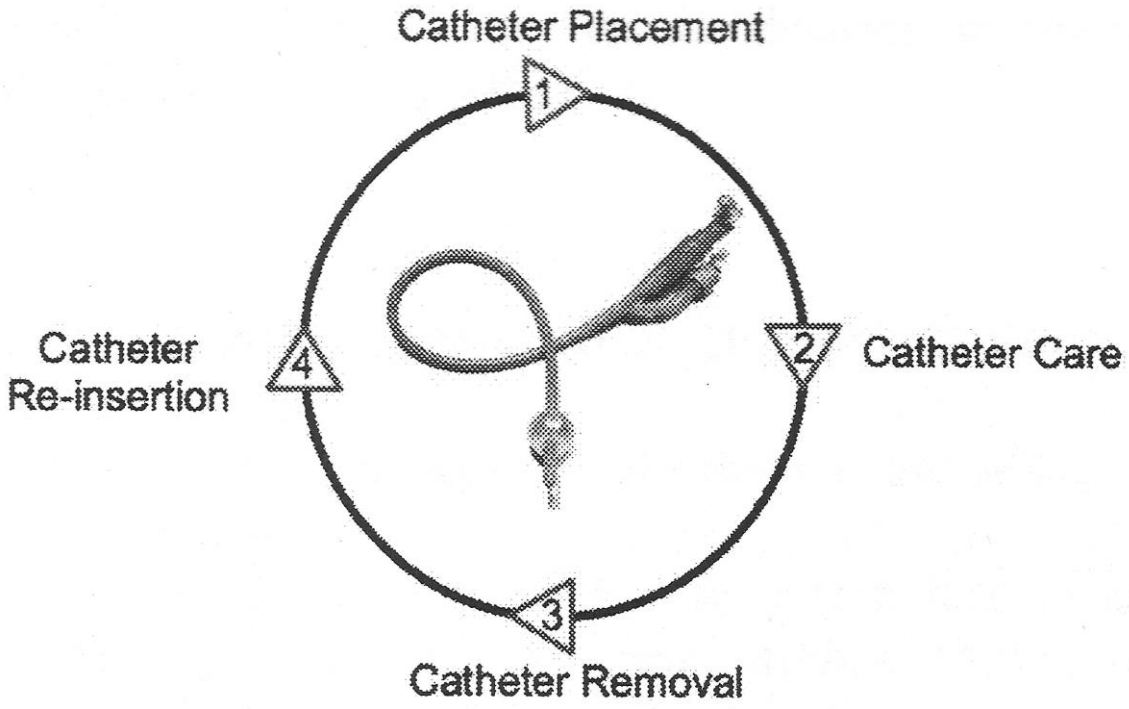
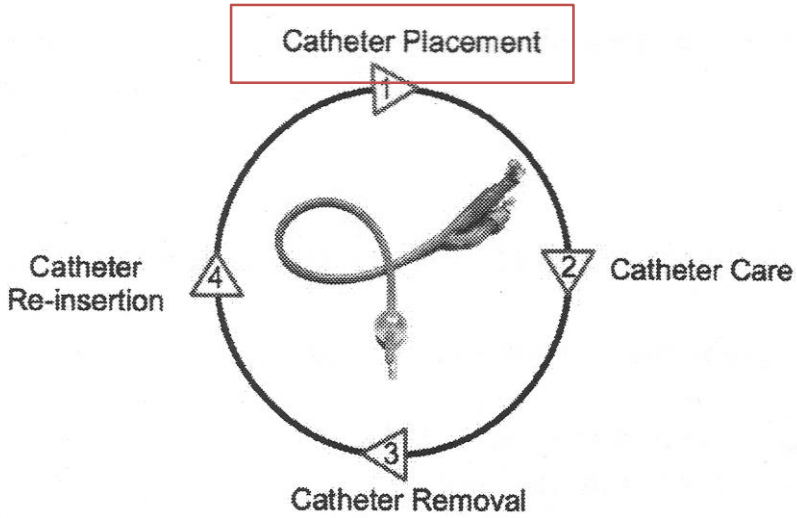
Quality Improvement



Life Cycle of a Urinary Catheter

Meddings et al (2014) BMJ Qual Saf; 23; pp; 277 - 289



Life Cycle of a Urinary Catheter

Choosing the right catheter

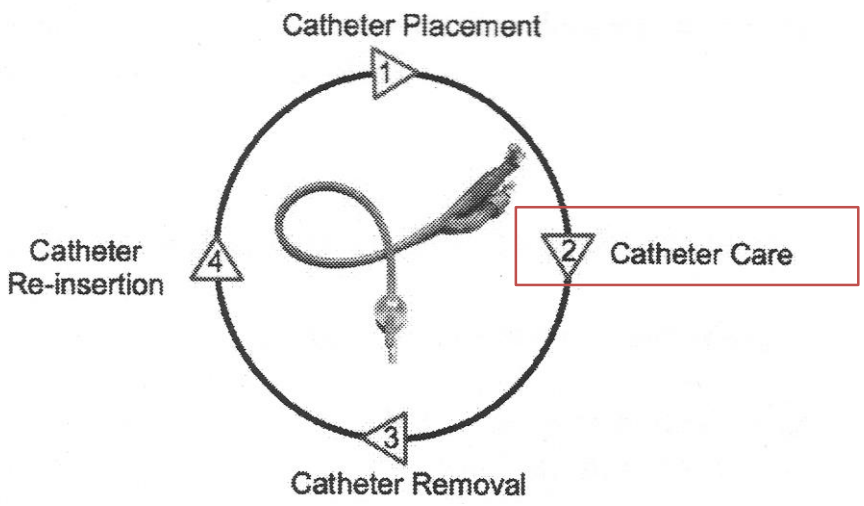
- **Short term:** latex catheter
- **Medium term:** silicone catheter +/- silver or antibiotic
- **Long term catheter:** silicone catheter +/- silver or antibiotic
- **Area for development:** catheter that does not stimulate an inflammatory reaction and reduces biofilm development

Assessing the need for a catheter

- Acute urinary retention or bladder outlet obstruction
- Need for accurate measurement of urinary output in critically ill patient
- Perioperative use for selected surgical procedures
- Assist with healing of sacral or perineal wounds in incontinent patients
- Patient requires prolonged immobilisation
- To improve comfort for end of life care
- Is there an alternative? Continence nurse

Insertion technique

- Educated staff
- Principles of aseptic technique
  - Document insertion
  - Standardising catheter packs
- Controlled environment



Life Cycle of a Urinary Catheter

Maintaining catheter

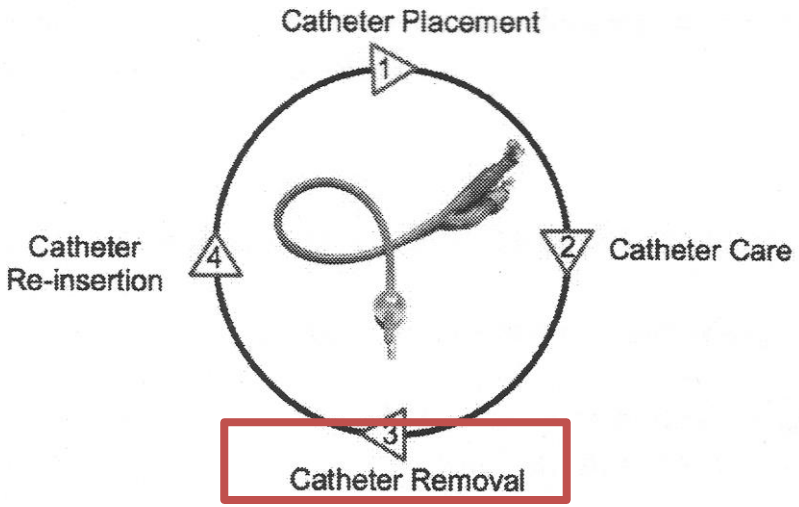
- Maintain a closed system
- Ensure catheter is secured
- Maintain unobstructed flow; no kinks
- Catheter collection bag is below bladder
- Replace catheter and bag if break in system
- Empty bag regularly using separate clean container for each patient
- Employ routine hygiene and standard precautions
- Do Not irrigate bladder or bag with antimicrobials or antiseptic solutions

Specimen Collection

- Aspirate from sample port with sterile syringe or larger volumes from drainage bag aseptically
- Do not employ routine screening for ASB

Educate patient and family

- To provide patient and families with information on how to maintain their catheter
- Wilde et al (2013) optimal fluid intake and preventing dislodgement
- Laws and Rees (2014) passport and pack



Remove the catheter

Implement an organisational program to review necessity for continued catheterization;

- Automatic stop orders
- Standardised electronic or paper reminders
- Conduct daily review i.e. nurse rounding

Urinary continence

Develop protocol for post operative urinary retention.

- Nurse directed intermittent catheterization
- Introduce bladder scanning protocol and training program

Documentation

Implement a system for documenting;

- Order for placement
- Indications for insertion
- Date/time and name of inserter
- Daily presence
- Maintenance tasks
- Date expected removal

Meta Analysis

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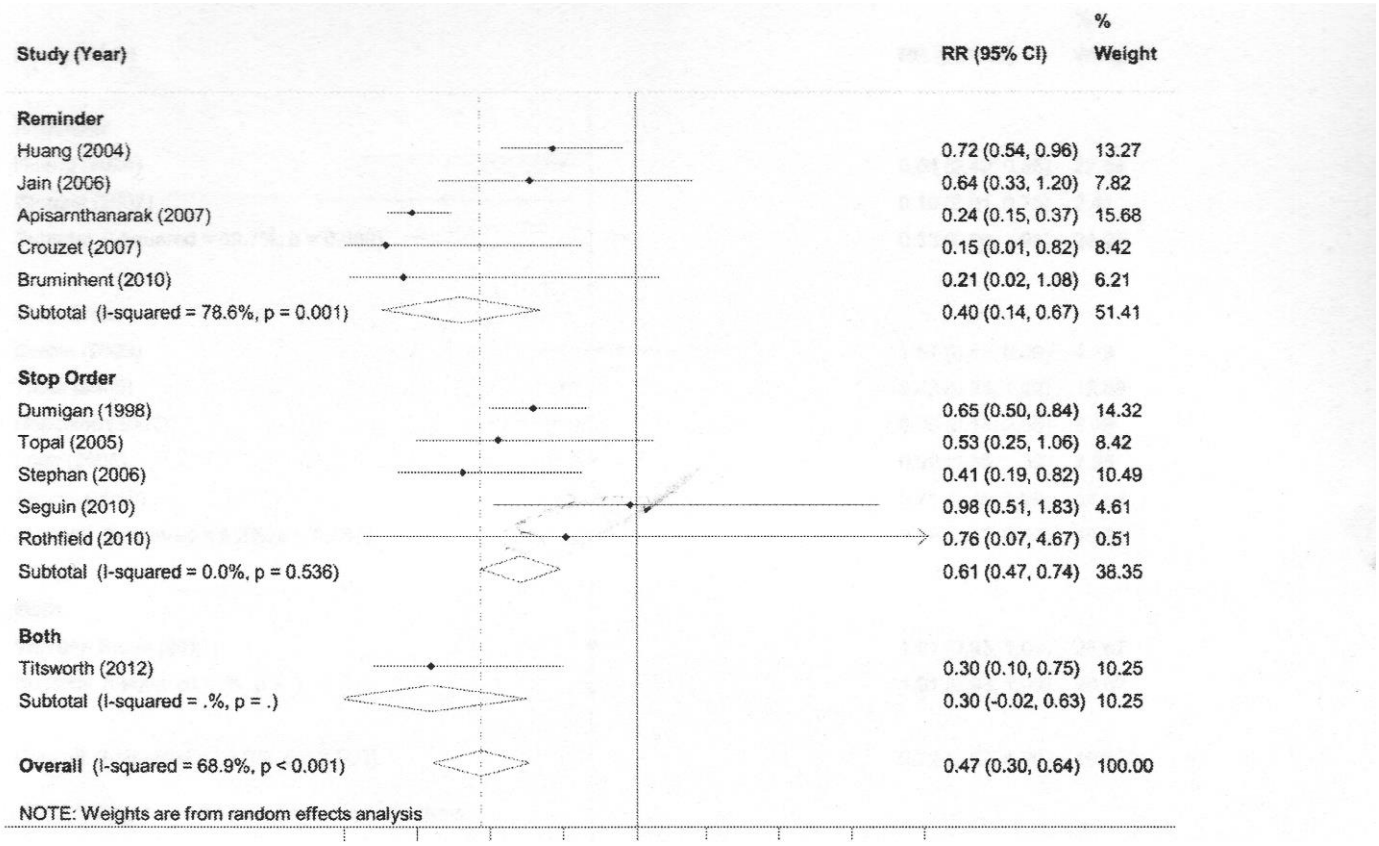
Quality Improvement



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Patient centred care

Community Partners

Clinical Area Specialists

Infection Control Team

Microbiology

Nursing Medical Educators

Urology CNC

Skin Integrity Wound CNC

Antimicrobial Team Medical Delegate Pharmacist

Continence CNC Physio

Partnership

Resources

Evelyn Lo *et al* (2014). Strategies to Prevent Catheter-Associated Urinary Tract Infections in Acute Care Hospitals: 2014 Update. Infection Control & Hospital Epidemiology, 35, pp 464-479

Pratt R J *et al* (2007). Epic2: National Evidence-Based Guidelines for Preventing Health-Care Associated Infections in NHS Hospitals in England. Journal of Hospital Infection, 65S, pp S1-S64.

IHI Program to Prevent CAUTI http://www.ihi.org/

APIC CAUTI Elimination Guide http://www.apic.org/

IDSA Guidelines (Clin Infect Dis 2010;50:625-63)