Reducing catheter associated urinary tract infections

MAY 2013

VICKIE LONGSTAFF
CONSULTANT NURSE INFECTION CONTROL

Content

- Urinary tract infection
- Epidemiology and Pathogenesis
- Diagnosis
- Treatment
- Catheter management
- Prevention
- Summary and recommendations

Urinary Tract Infection

- Urinary tract infections (UTI) associated with urinary catheters
- Leading cause of secondary HCA bacteremia.
- Approximately 20% of hospital-acquired bacteremias arise from the urinary tract
- Mortality associated is about 10%

UTI

- Symptomatic catheter-related bacteriuria (usually referred to as UTI since a clinically significant infection is inferred) is defined as the presence of fever >38°C, suprapubic tenderness, or otherwise unexplained systemic symptoms such as altered mental status, hypotension
- Or evidence of a systemic inflammatory response syndrome, together with a positive urine test

UTI

- Patients who are no longer catheterized but had indwelling urinary catheters within the past 48 hours are also considered to have catheter-associated UTI if they meet these definitions

Epidemiology

- The organisms that cause UTI in a hospital or nursing home are often of different species
- May have greater antibiotic resistance than bacteria that cause UTI in the ambulatory setting

Epidemiology and Pathogenesis

- Bacteriuria in patients with indwelling bladder catheters occurs at a rate of approximately 3-10% per day of catheterization
- The clinical significance of asymptomatic bacteriuria in catheterized patients is uncertain Of those with bacteriuria, 10-25%develop symptoms of urinary tract infection

Epidemiology and Pathogenesis

- Factors increasing risk of bacteriuria or urinary tract infection include:
  - Female sex
  - Diabetes mellitus
  - Prolonged catheterization
  - Bacterial colonization of the drainage bag
  - Errors in catheter care (eg, errors in sterile technique, maintaining a closed drainage system, etc).

Extraluminal Infection

- Extraluminal infection occurs via entry of bacteria into the bladder along the biofilm that forms around the catheter in the urethra
- Extraluminal is more common than intraluminal infection (66 versus 34% in one study)

Intraluminal Infection

- Intraluminal infection occurs due to urinary stasis because of drainage failure, or due to contamination of the urine collection bag with subsequent ascending infection

Diagnosis

- Evaluating for asymptomatic bacteriuria in patients with indwelling catheters is warranted only in the setting of pregnancy or prior to urologic procedures for which mucosal bleeding is anticipated
- Patients with catheter associated bacteriuria may not be symptomatic. Even when in the setting of fever, leukocytosis, and urinary symptoms, it can be difficult to attribute these clinical features to UTI rather than other conditions

Diagnosis

- Evaluation for urinary tract infection is appropriate when patients develop fever or otherwise unexplained systemic manifestations compatible with infection (eg, malaise, altered mental status, fall in blood pressure, metabolic acidosis, respiratory alkalosis)

Diagnosis

- It can be difficult to distinguish true pathogens from colonising organisms in catheterized patients with bacteriuria, since it is difficult to correlate clinical manifestations with laboratory findings.
- Urine samples should be obtained prior to initiation of antibiotics

Diagnosis

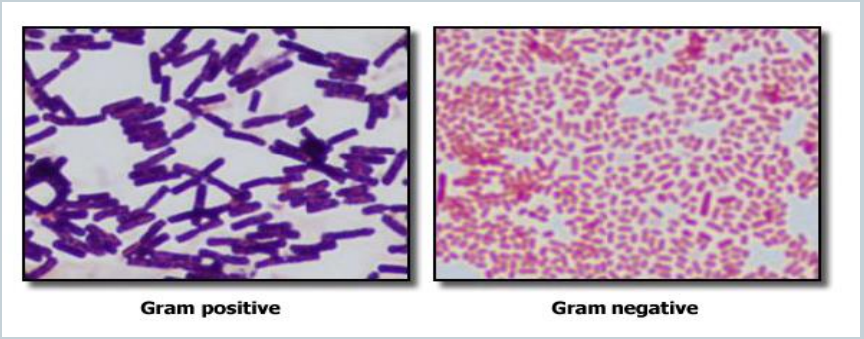
- Ideally urine samples for culture should be obtained by removing the catheter and obtaining a midstream specimen
- If ongoing catheterization is needed, ideally the catheter should be replaced prior to collecting a urine sample for culture, to avoid culturing bacteria present in the biofilm of the catheter but not in the bladder

Diagnosis

- Many systems have a "needleless" site that can be cleansed prior to specimen collection. If a sample is being collected without catheter removal, urine should be obtained from the port in the drainage system
- Culture results from urine collected from the drainage bag cannot be used to guide treatment

Treatment

- Antimicrobial selection should be based upon the culture results when available.
- If treatment is required prior to culture data, the choice of empiric antibiotics should be based upon urine Gram stain, previous culture results, if available, or upon the antimicrobial sensitivity patterns of organisms in the hospital or community



Treatment

1st line:
Nitrofurantoin 50-100mg QDS oral (if CrCl > 20)
+
If evidence of severe sepsis and/or indwelling urinary catheter, add in:
Gentamicin 5mg/kg STAT IV
If further Gentamicin indicated: 5mg/kg OD IV (TDM)

2nd line:
Trimethoprim 200mg BD oral
+
If evidence of severe sepsis and/or indwelling urinary catheter, add in:
Gentamicin 5mg/kg STAT IV
If further Gentamicin indicated: 5mg/kg OD IV (TDM)

Duration of treatment: 3 days in non-pregnant women; 7 days in pregnancy or men

The incidence of Multi-resistant Gram negatives with ESBLs is increasing especially in elderly patients with recurrent UTIs and indwelling catheters - discuss with Microbiologist if evidence of increasing sepsis or multi-resistant antibiotic pattern on previous isolates.
Rationalise antibiotics according to urine M, C & S results.

Catheter Management

- In general, patients who no longer require catheterization should have the catheter removed and then receive appropriate antimicrobial therapy

- Patients who require extended catheterization should be managed with intermittent catheterization, if possible

Catheter Management

- If long term catheterization is needed and intermittent catheterization is not feasible, the original indwelling catheter should be replaced at the initiation of antibiotic therapy
- Catheter replacement is associated with fewer and later relapses than retaining the original catheter, as biofilm penetration of most antibiotics is poor

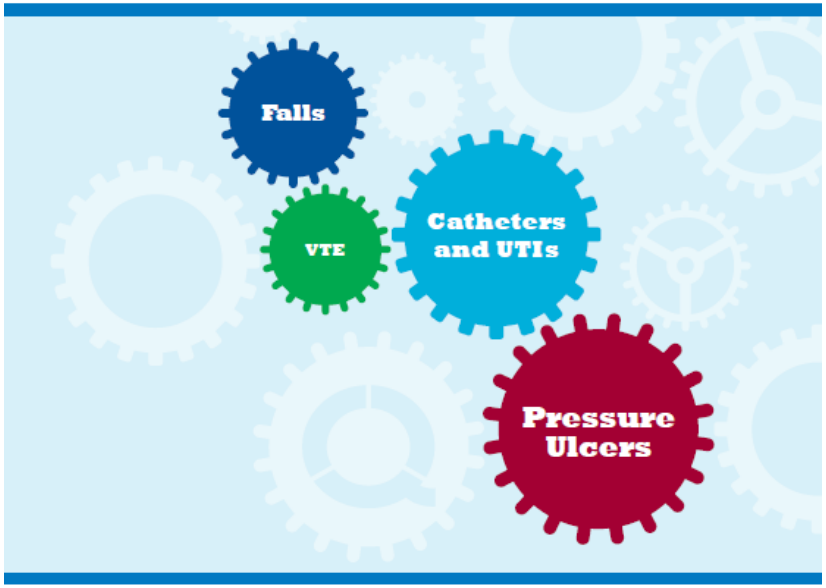
Urinary Catheter Manipulation Prophylaxis

- Prophylaxis is not indicated under most circumstances
- Indicated in patients who are neutropenic or have a prosthesis insitu

Gentamicin 80mg IV or IM STAT
just before manipulation

- In patients who Gent allergic, known to have had Gent resistant organisms or to be at high risk of post manipulation infective complications discuss with a microbiologist

Delivering the NHS Safety Thermometer CQUIN 2013/14



A new mindset in patient safety improvement

NHS Safety Thermometer

- The NHS Safety Thermometer is a local improvement tool for measuring, monitoring and analysing patient harms and 'harm free' care.

Supporting 'harm free' care

- The NHS Safety Thermometer provides a quick and simple method for surveying patient harms and analysing results so that you can measure and monitor local improvement and over time.
- From July 2012 data collected using the NHS Safety Thermometer is part of the Commissioning for Quality and Innovation (CQUIN) payment programme.

Safety Thermometer

- In 2012/13, the NHS Safety Thermometer national CQUIN is being used to reward organisations for establishing measurement systems and submitting NHS Safety Thermometer data.
- In 2013/14, the national CQUIN will continue to be available to reward data collection, but for those organisations now with robust baseline data, the CQUIN should be used to incentivise improvement to reduce the amount of harm patients experience.

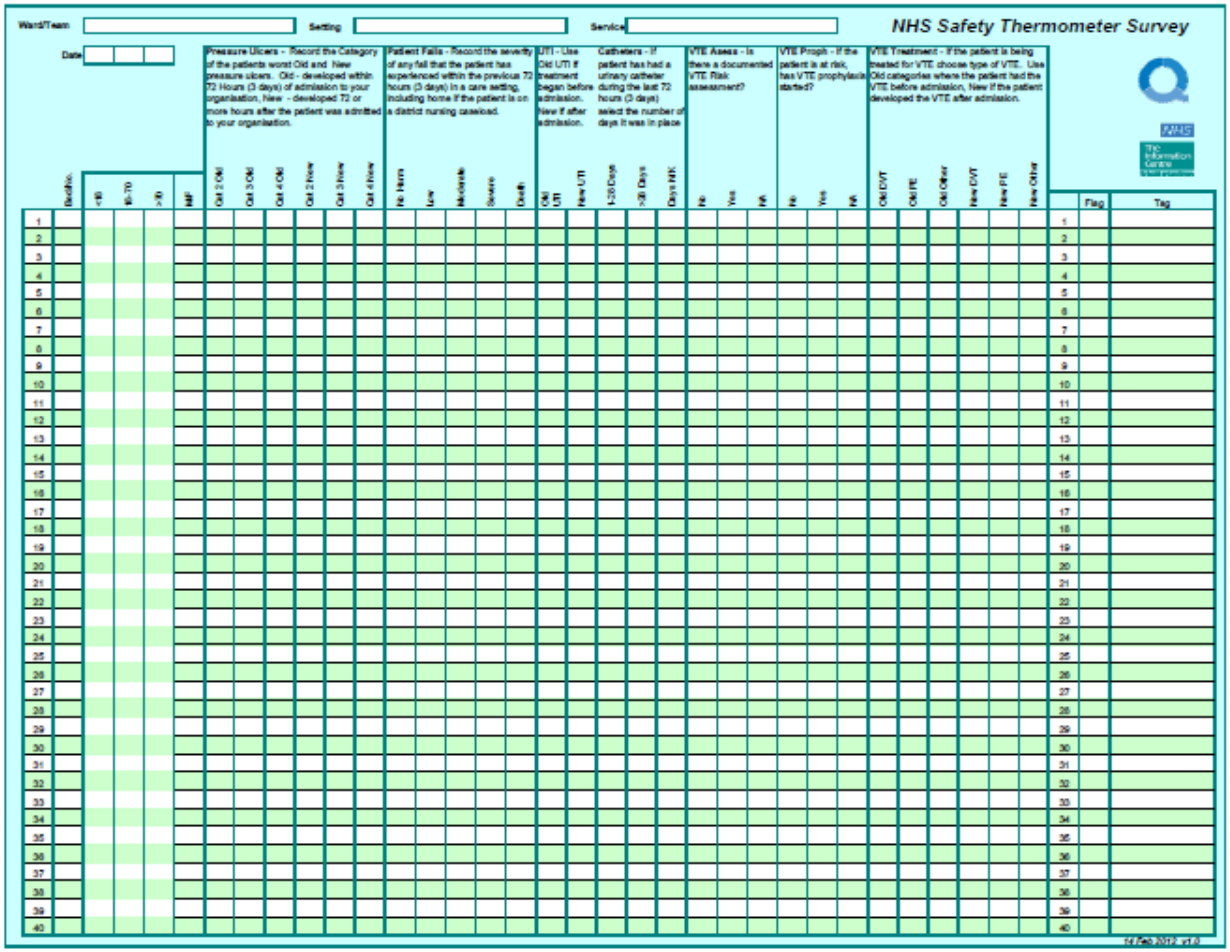
Each month the HSCIC publishes a national NHS Safety Thermometer containing data submitted by providers of care in the previous month. The September 2012 publication contains an aggregate dataset of 706,927 patients submitted by 520 providers of NHS funded care. These national data are illustrated in run charts of the core measures.

Data summary of the core measures

Measure	Prevalence (median)
P.3. Pressure ulcer prevalence	6.6%
F.2. The proportion of patients with harm from a fall in care	1.2%
C.1. Proportion of patients with a catheter	15.3%
C.2. Treatment of any urine infection (in patients with a catheter)	4.7%
V.1. The proportion of patients with a VTE risk assessment	85.1%
V.2. The proportion of patient with appropriate prophylaxis	75.9%
V.3. The proportion of patients being treated clinically for a new VTE	1.4%
HFC.1. The proportion of patients with 'harm free' care	91.3%

Definitions

- UTI= patient being treated for UTI
- Old TUI = treatment began before admission
- New UTI = treatment started after admission
- Number of days patient has had a catheter



Ward/Team | Setting | Service

NHS Safety Thermometer Survey

Date

Pressure Ulcers - Record the Category of the patients worst Old and New pressure ulcers. Old - developed within 72 Hours (3 days) of admission to your organisation, New - developed 72 or more hours after the patient was admitted to your organisation.

Patient Falls - Record the severity of any fall that the patient has experienced within the previous 72 hours (3 days) in a care setting, including home if the patient is on a district nursing caseload.

UTI - Use Old UTI if treatment began before admission. New if after admission.

Catheters - If patient has had a urinary catheter during the last 72 hours (3 days) select the number of days it was in place

VTE Asess - Is there a documented VTE Risk assessment?

VTE Proph - If the patient is at risk, has VTE prophylaxis started?

VTE Treatment - If the patient is being treated for VTE choose type of VTE. Use Old categories where the patient had the VTE before admission, New if the patient developed the VTE after admission.

	Bed No.	<10	10-70	>70	MF	Cat 2 Old	Cat 3 Old	Cat 4 Old	Cat 2 New	Cat 3 New	Cat 4 New	No Harm	Low	Moderate	Severe	Death	Old UTI	New UTI	1-28 Days	>28 Days	Days N/K	No	Yes	NA	No	Yes	NA	Old DVT	Old PE	Old Other	New DVT	New PE	New Other		Flag	Tag
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Catheters | Number | Detail | Clear Filters | Menu | Copy | Print

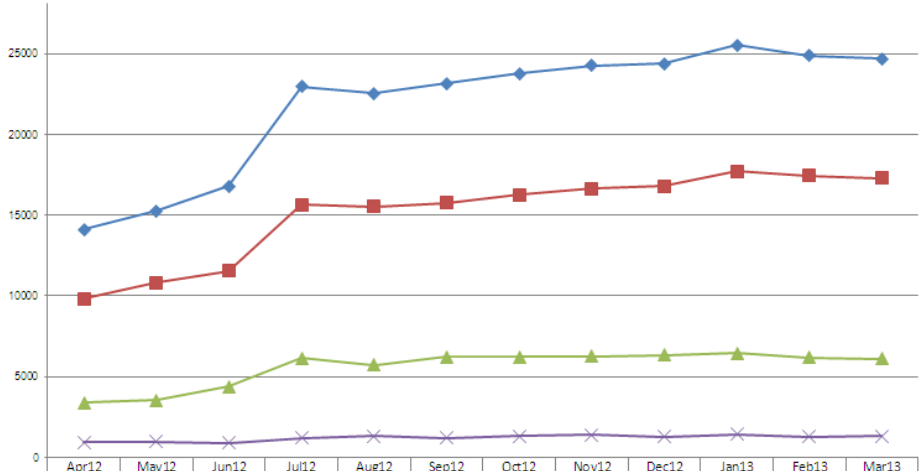
NHS Safety Thermometer

All Organisations

All Wards and Teams

All Settings | All Services

All Ages | All Sexes



	Apr12	May12	Jun12	Jul12	Aug12	Sep12	Oct12	Nov12	Dec12	Jan13	Feb13	Mar13
All Catheters	14114	15276	16785	22980	22529	23162	23784	24278	24391	25538	24880	24685
1-28 days	9798	10801	11530	15637	15529	15751	16270	16654	16796	17702	17448	17290
>28 days	3389	3527	4368	6139	5705	6215	6199	6261	6329	6426	6167	6092
Days Not Known	927	948	887	1204	1295	1196	1315	1363	1266	1410	1265	1303
Patients	92791	101647	116599	168554	168019	172918	181370	185113	183522	189624	188113	185407

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Catheters | Percent | Detail | Clear Filters | Menu | Copy | Print

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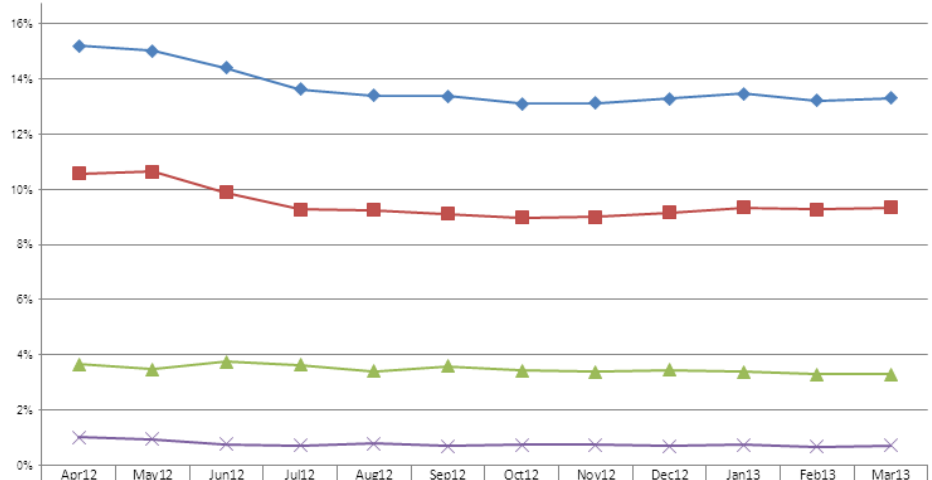

	Apr12	May12	Jun12	Jul12	Aug12	Sep12	Oct12	Nov12	Dec12	Jan13	Feb13	Mar13
All Catheters	15.21	15.03	14.4	13.63	13.41	13.39	13.11	13.12	13.29	13.47	13.23	13.31
1-28 days	10.56	10.63	9.89	9.28	9.24	9.11	8.97	9	9.15	9.34	9.28	9.33
>28 days	3.65	3.47	3.75	3.64	3.4	3.59	3.42	3.38	3.45	3.39	3.28	3.29
Days Not Known	1	0.93	0.76	0.71	0.77	0.69	0.73	0.74	0.69	0.74	0.67	0.7
Patients	92791	101647	116599	168554	168019	172918	181370	185113	183522	189624	188113	185407

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NHS Safety Thermometer

All Organisations

All Wards and Teams

All Settings | All Services

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	Apr12	May12	Jun12	Jul12	Aug12	Sep12	Oct12	Nov12	Dec12	Jan13	Feb13	Mar13
Harm Free	89.93	90.21	90.35	91.11	91.22	91.78	91.99	92.27	92.41	92.30	92.19	92.49
Pressure Ulcers - All	6.79	6.67	6.55	6.07	5.95	5.52	5.40	5.27	5.19	5.42	5.57	5.32
Pressure Ulcers - New	1.70	1.68	1.54	1.48	1.35	1.30	1.21	1.23	1.17	1.28	1.34	1.27
Falls with Harm	1.29	1.21	1.16	1.16	1.16	1.08	1.04	0.99	1.01	0.94	0.95	0.91
Catheters & UTIs	1.54	1.46	1.38	1.25	1.21	1.22	1.14	1.07	1.03	0.98	0.99	0.96
Catheters & New UTIs	0.72	0.66	0.67	0.59	0.60	0.57	0.54	0.49	0.49	0.47	0.48	0.45
New VTEs	1.03	0.97	1.05	0.84	0.90	0.79	0.77	0.74	0.68	0.68	0.64	0.62
All Harms	10.07	9.79	9.65	8.89	8.78	8.22	8.01	7.73	7.59	7.70	7.81	7.51
New Harms	4.58	4.39	4.29	3.95	3.89	3.65	3.48	3.35	3.27	3.28	3.33	3.19
Sample	92,791	101,647	116,599	168,554	168,019	172,918	181,370	185,113	183,522	189,624	188,113	185,407
Surveys	4548	5063	5866	8806	8878	8952	9082	9230	9038	9368	9212	8998
Organisations	222	258	288	448	495	519	555	577	587	591	617	590

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Catheters & UTIs | Percent | Summary | Clear Filters | Menu | Copy | Print

NHS Safety Thermometer

All Organisations

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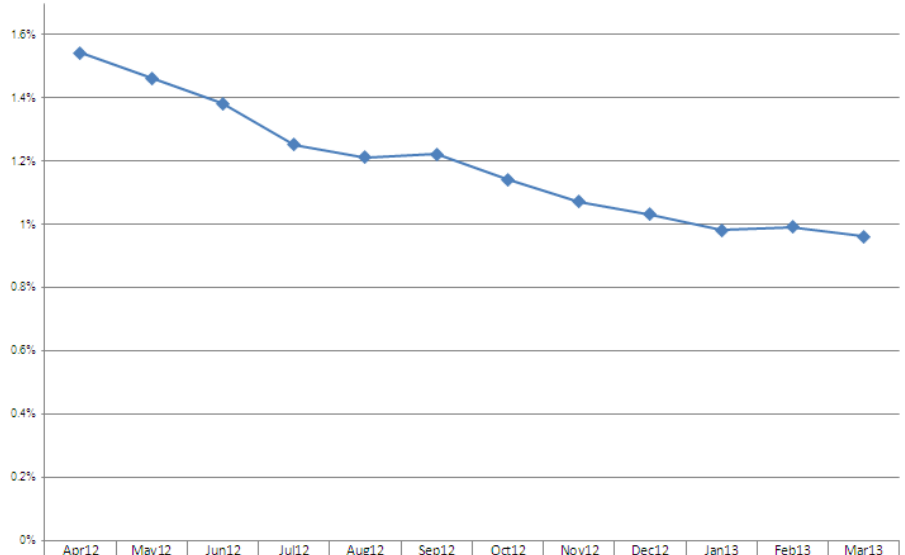

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All Catheters with UTIs	1.54	1.46	1.38	1.25	1.21	1.22	1.14	1.07	1.03	0.98	0.99	0.96
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Catheter & New UTI | Percent | Clear Filters Menu Copy Print

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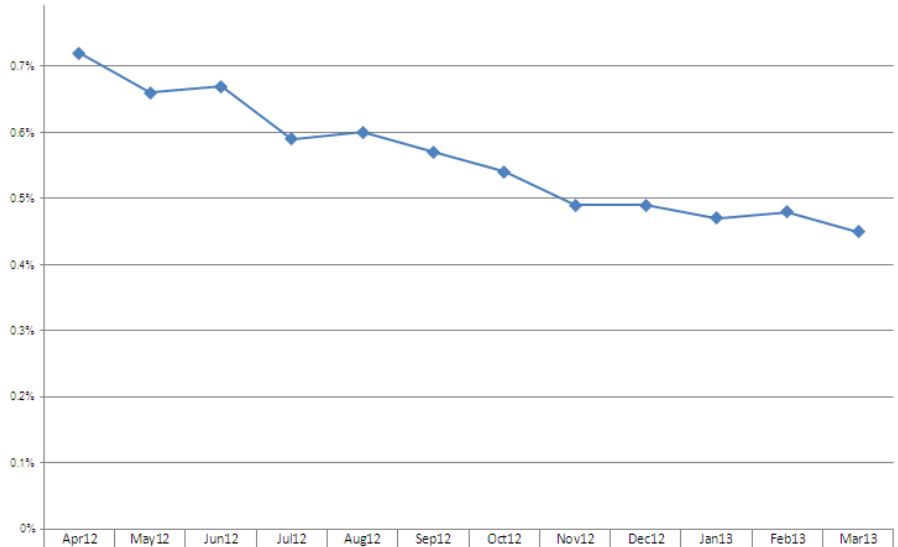

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Health Protection Agency

English National Point Prevalence Survey on Healthcare-associated Infections and Antimicrobial Use, 2011

Preliminary data

IPS Infection Prevention Society

HEALTHCARE INFECTION SOCIETY

BIAM British Infection Association

BSAC British Society for Antimicrobial Chemotherapy

Aims and objectives of 2011 PPS

- To estimate the total burden (prevalence) of HCAI and AMU in acute care hospitals in England.
- To describe patients, invasive devices, HCAI and AMU by types of patients, specialties, and healthcare facilities.
- To describe the HCAI sites, micro-organisms and markers of resistance.
- To describe the AM compounds prescribed, their indications and AMU quality indicators.
- To disseminate the results to those who need to know at local, regional and national level to raise awareness.
- To train and reinforce surveillance structures and skills, by developing a comprehensive training programme on the protocol and definitions.
- To identify areas of concern and develop appropriate national priorities for incidence surveillance, research and policy interventions.
- To identify and develop priority areas for AMU quality indicators in line with the national AM stewardship programme.

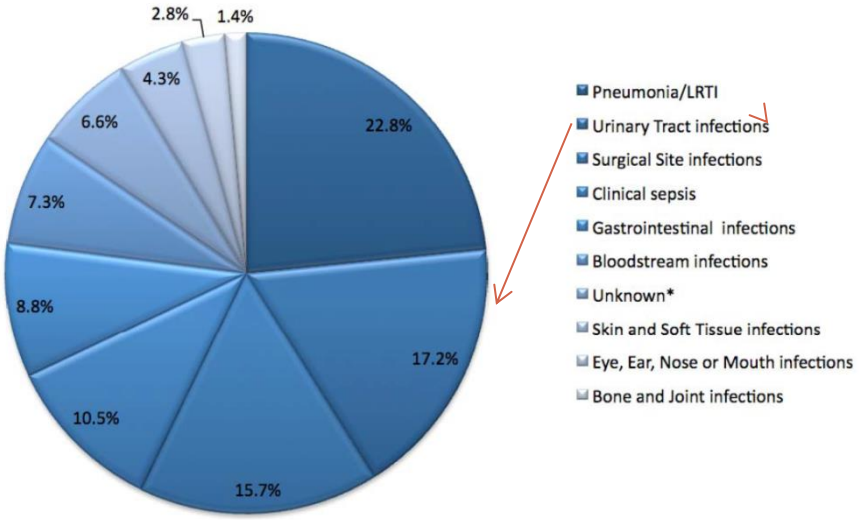
English National PPS on HCAI and Antimicrobial Use, 2011

- The prevalence of healthcare-associated infections (HCAI) was 6.4% in 2011 compared to 8.2% in 2006.
- The most frequent HCAIs detected were respiratory tract, urinary tract and surgical site infections.
- The prevalence of antimicrobial use (AMU) was 34.7%. This is the first time AMU was measured nationally. This provides a baseline for future monitoring.
- The prevalence of HCAIs, AMU and device use was highest in intensive care units, which relates in part to the complexity and vulnerability of patients in this setting.

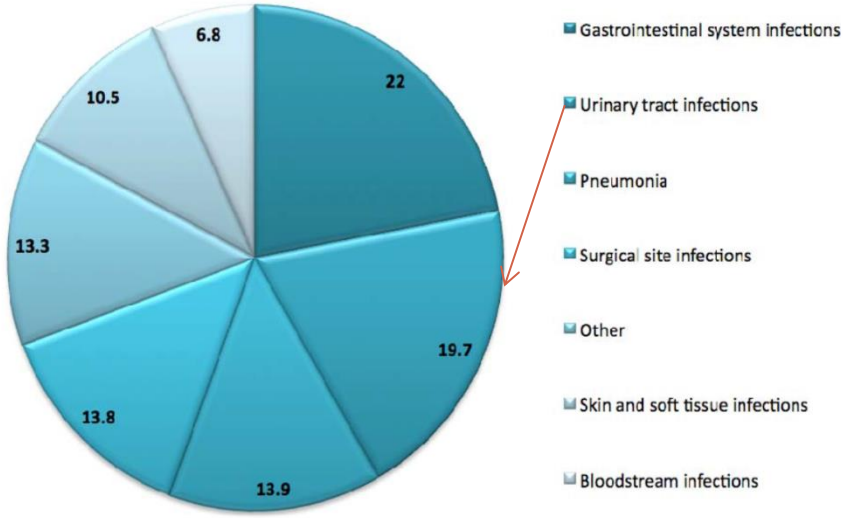
English National PPS on HCAI and Antimicrobial Use, 2011

- 103 hospitals participated with 55,443 patients
- HCAI prevalence 6.4%
- ITU 23.4% and surgical wards 8%
- The six most common types of HCAI, which accounted for more than 80% of all HCAI
  - respiratory tract infections (pneumonia and other respiratory infections) (22.8%)
  - **urinary tract infections (UTI) (17.2%)**
  - surgical site infections (SSI) (15.7%)
  - clinical sepsis (10.5%)
  - gastrointestinal infections (8.8%)
  - bloodstream infections (BSI) (7.3%).
- Paediatric survey population, the most common HCAI were
  - clinical sepsis (40.2%)
  - respiratory tract infections (15.9%)
  - bloodstream infections (BSI) (15.1%).

2011


2.8%
1.4%
4.3%
6.6%
22.8%
7.3%
8.8%
17.2%
10.5%
15.7%
Pneumonia/LRTI
Urinary Tract infections
Surgical Site infections
Clinical sepsis
Gastrointestinal infections
Bloodstream infections
Unknown*
Skin and Soft Tissue infections
Eye, Ear, Nose or Mouth infections
Bone and Joint infections

2006


6.8
22
10.5
13.3
19.7
13.8
13.9
Gastrointestinal system infections
Urinary tract infections
Pneumonia
Surgical site infections
Other
Skin and soft tissue infections
Bloodstream infections

Number and percentage of device-associated HCAI

Device-associated infections	Number of HCAI	Percent of each HCAI
	N	%
Pneumonia/LRTI	**798**	**100.0**
Intubation within 48 hours before onset	148	18.6
No intubation	518	64.9
Presence of intubation unknown	132	16.5
UTI	**605**	**100.0**
Urinary catheter within 7 days before onset	260	43.0
No urinary catheter	296	48.9
Presence of urinary catheter unknown	49	8.1
BSI, primary	**159**	**100.0**
Vascular access device within 48 hours before onset	102	64.1
No vascular access device	30	18.9
Presence of vascular access device unknown	27	17.0

SUMMARY OF HCAI PRIORITIES:

1. Sustained education of clinical staff on the methods of prevention of HCAI.
2. Development of learning tools for the prevention of healthcare-associated pneumonia.
3. Assessment of competency for device insertion – urinary catheter, central and peripheral vascular catheters - should be regularly undertaken and be reviewed at each new healthcare setting or site.
4. Guidance on the prevention and control of Enterobacteriaceae within healthcare settings.
5. Increased surveillance on surgical site infections, especially in surgical specialties where a high prevalence was detected.
6. Development of standardised incidence surveillance methodology for pneumonia and catheter-associated UTI.
7. Public benchmarking and incidence surveillance in ICU – particularly ventilator-associated pneumonia.
8. Public reporting of organisations device prevalence to assist in reducing device use and shortening duration of use.

SUMMARY OF ANTIMICROBIAL PRIORITIES:

1. Development of guidelines for important broad spectrum antimicrobials, for example, meropenem.
2. Development of antimicrobial stewardship and prescribing competencies.
3. Public reporting of antimicrobial consumption data for each hospital, with case mix stratification.
4. Improvement in the documentation of antimicrobial indication in clinical notes (either electronic or paper).
5. Education of clinical staff to ensure they document an accurate reason for antimicrobial prescribing, for example, altering the indication from surgical prophylaxis to treatment when indicated.
6. Developing of AMU national quality indicators for benchmarking across organisations in England.

Prevention

PREVENTION IS BETTER THAN CURE!

Urinary Catheter HII Care Bundle

- Aseptic technique for insertion
- Hand hygiene
- Documentation of insertion
- Continued indication – remove asap
- Maintain a closed system – drainage bag below level of bladder but off the floor
- Catheter hygiene
- Aseptic sampling technique

Aseptic Non Touch Technique (ANTT)

- **ANTT can be applied to any aseptic technique**
- Remember…
- **The principles of ANTT are simple:**
  - **A**lways wash hands effectively.
  - **N**on-touch-technique always
  - **T**ake appropriate equipment precautions.
  - **T**ake steps to protect key-parts at all times.

ANTT®
Aseptic non touch technique

Indwelling urinary catheterisation

for the ANTT practice principles see www.antt.org.uk

V1.2

Prep patient
- Apply waterproof pad & gown.
- Ask patient to lift gown pre step 9.

Preparation zone

1 **Clean hands** with alcohol hand rub or soap & water

2 **Clean trolley** according to local policy

3 **Gather equipment** onto bottom shelf

Patient zone

4 **Apply apron** (clean hands if contaminated between steps 3 & 4)

5 **Open catheter pack** & position waste bag

6 **Open equipment** onto critical aseptic field using non-touch technique (NTT)

7 - **Clean hands**
- **Apply sterilised gloves**

8 **Prepare equipment** using non-touch technique (NTT)

9 **Apply aseptic field drapes** over genitals & between legs

10 **Clean urethral orifice** with normal saline & gauze

11 **Insert lubricating gel**

12 - **Dispose gloves**
- **Clean hands**
- **Apply sterilised gloves**

13 **Insert catheter** using NTT by touching only the plastic wrapping

14 **Inflate balloon** using NTT

15 **Attach collection bag** using NTT

16 **Dispose of waste & gloves**

17 **Clean hands** with soap & water immediately after glove removal

Decontamination zone

18 **Clean trolley** according to local policy

19 **Clean hands** with alcohol hand rub or soap & water

Type your Hospital or Community name here NHS

Care Bundle - Documentation

- Date of catheter insertion
- Reason for insertion
- Type of device inserted, - Size, type of catheter, batch no, amount of water used to inflate balloon (use label supplied with catheter).
- Name of the person inserting the device
- Proposed date for change/ removal of catheter

Catheter Hygiene

- Cleansing with soap and water around the catheter (periurethral, suprapubic) during bathing is adequate for ongoing maintenance
- For urethral catheters, do not use meatal disinfectants or antibacterial urethral lubricants because they do not prevent infection, and may lead to development of resistant bacteria at the meatus

Catheter Hygiene

- When the catheter or drainage system is manipulated for any reason, non-sterile gloves should be used and then immediately discarded and hand hygiene performed
- The bag should be emptied regularly, avoiding contact of the drainage spigot with the collecting container
- Separate collecting containers should be used for each patient

Bladder Irrigation

- Bladder irrigation is reserved for selected patients (eg, postoperative, pharmacologic therapy) or for the management of hematuria
- If there is a suspicion that the latex catheter material contributed to the obstruction, the catheter should be changed to a silicone catheter to reduce future encrustation

Catheter Removal

- The simplest strategy for preventing catheter-related UTI is catheter removal when the indication for insertion is no longer met
- Review the need for the catheter regularly and question the requirement

Summary and Recommendations

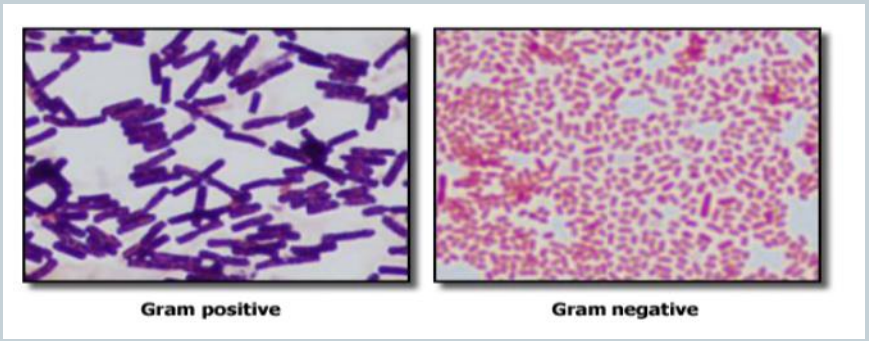
- Important risk factors for UTI associated with urinary catheters include female sex, prolonged catheterization, bacterial colonization of the drainage bag and errors in catheter care including errors in sterile technique and in maintaining a closed drainage system.

Summary and Recommendations

- Patients with indwelling catheters often do not experience typical signs of urinary tract infection. Nevertheless blood and urine cultures should be obtained when patients develop fever or otherwise unexplained systemic manifestations compatible with infection

Summary and Recommendations

- Ideally urine sample for culture should be obtained by removing the indwelling catheter and obtaining the sample through a new catheter. When this is not possible, the culture should be obtained through the catheter port, not the drainage bag



Summary and Recommendations

- Antimicrobial selection should be based upon the culture results when available. If treatment is required prior to culture data, the choice of empiric antibiotics should be based upon urine Gram stain, previous culture results, if available, or upon the antimicrobial sensitivity patterns of organisms in the hospital or community

Summary and Recommendations

- Patients with infection who no longer require catheterization should have the catheter removed and receive appropriate antimicrobial therapy
- If long term catheterization is needed and intermittent catheterization is not feasible, the original indwelling catheter should be replaced at the initiation of antibiotic therapy

Summary and Recommendations

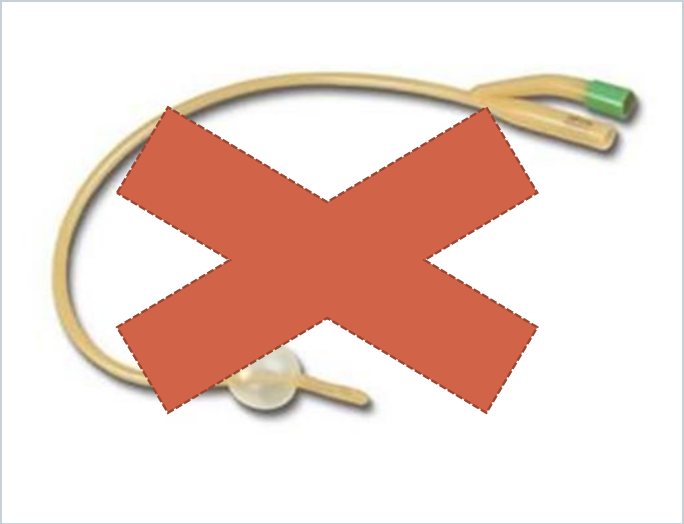
- Evaluating for asymptomatic bacteriuria in patients with indwelling catheters is warranted only in the setting of pregnancy or prior to urologic procedures for which mucosal bleeding is anticipated.
- For other asymptomatic patients with long-term bladder catheters, routine urine cultures and urinalyses are not warranted

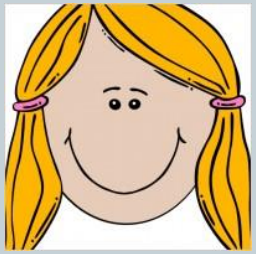
Summary and Recommendations

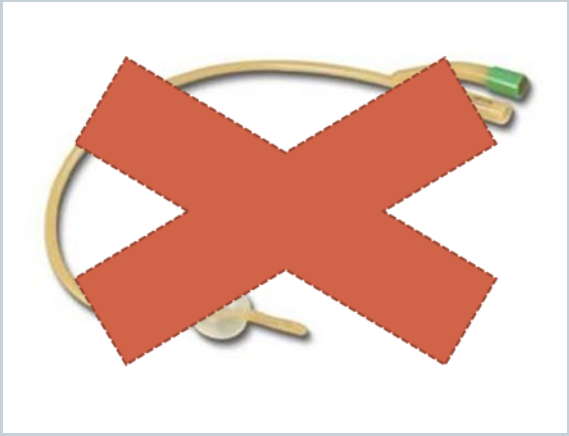
- There is no role for use of prophylactic antibiotics to reduce risk of catheter associated urinary tract infection
- Scrupulous catheter insertion and care essential to reduce the risk of infection

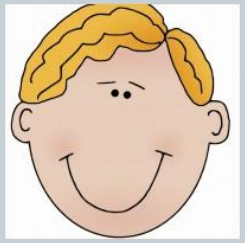
Summary and Recommendations

- Review the requirement of the urinary catheter regularly
- If the catheter is longer required, check and REMOVE IT!









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Questions

THANK YOU FOR LISTENING