Gram-negative blood stream infections - challenges and improvement plans

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Background

Blood stream infection caused by *E.coli* and other gram negative infections has been steadily rising in the UK alongside reductions in other infections like MRSA (graph 1). The UK regulator NHS Improvement has been tasked by the Minister of State for Health to reduce *E.coli* bacteraemia by 50% by 2021 with a 10% reduction in the first year.

National surveillance of *E.coli* blood stream infection (BSI) was established in the UK in 2011. Surveillance data on *Klebsiella* species and *Pseudomonas aeruginosa* is also now included.

Data summarised in the PHE infographic below shows that E.coli BSI occurs predominantly in the community with greatest risk among elderly patients.

Poor hydration poorly treated UTIs and bladder instrumentation have all been recognised as important factors in reducing *E.coli* and other gram negative BSIs.

Reduction of *E.coli* is not necessarily straightforward. Unlike MRSA it is carried by everyone and the 'usual' infection prevention interventions that worked so well for MRSA simply do not work for E.coli.
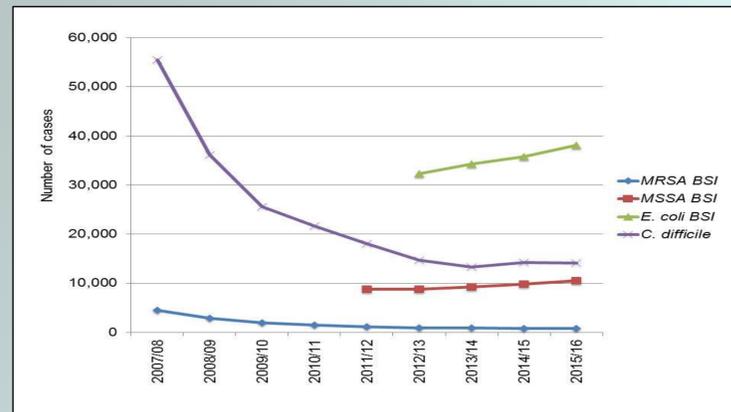
Graph 1

Key Focus Areas:

UTI Management

People with urine infections (UTI) who often get poor diagnostics and often inadequate treatments in the community
Patients with recurrent UTI or prostatitis

Hydration

Older people may have potential physical or cognitive issues that reduce hydration.
- Side effects of diuretics
- Poor mobility making it difficult to get a drink
- May be unable to hold a cup easily
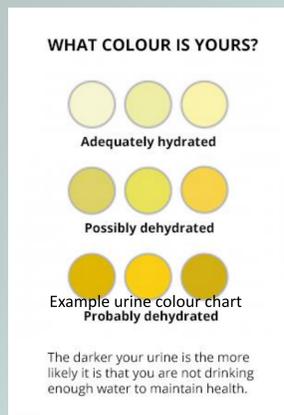- Not recognizing thirst
Those with continence issues may be reluctant to drink
- Mobility to toilet difficult, fear of a fall
- Availability and price of continence pads
Strategies to increase hydration include
- Increase number of opportunities for offering fluids
- Increase amount of fluids served
- Increase fluid rich foods
- Offer a choice of fluids for different tastes
- Provide cups that are pleasant to drink from and easy to hold
Check urine using a colour chart to monitor hydration

Urinary catheters

Urinary catheters and other devices such as nephrostomies and stents need careful management
The Infection Prevention Society R&D Group, Community Urinary Catheter Management Study Surveyed 149 District Nursing teams in 20 NHS organisations. There was a catheter prevalence = 11% Range 2.4 – 22%, 269 newly placed IUC:
76% in men; 75% >70 years old. 84% had clinical indication. Only 50% had Active Management Plan (range 20 – 96%) (date for removal or referral for trial without catheter)
Courtesy of Prof Jennie Wilson

Pneumonia

E.coli most common organism for HCAI in the 2011 National point prevalence survey and Hospital Acquired Pneumonia accounted for the highest proportion of infection
HAP is a significant cause of BSI , so impact on reducing HAP rates may also have impact of *E.coli* BSI rates
Improved Mobility #EndPJparalysis- campaign to get people up, dressed and moving
Improve oral Hygiene, breakdown biofilm on teeth, aspiration pneumonia.

IV Line care

Provides a direct route into the blood stream
Risk increases with the number of lines in situe and the longer they are in
Safe insertion and management essential
Prompt removal
Use IPS Saving Lives tools
https://www.ips.uk.net/files/6115/0944/9537/High_Impact_Interventions.pdf

Water hygiene

Increasing association of hand wash basins as a source of gram negative pathogens
Associated with use of the sink for disposal of other liquids
Gram negative bacteria more likely to colonise the traps and pipework if 'fed'
If we don't want people to put 'stuff' down hand wash sinks, what facilities do we supply?
Should we go 'waterless' in the ICU?

Skin care

Immobility may result in poor personal hygiene
Increased burden of organisms on the skin
More risk to devices and wounds
Possible benefit in antimicrobial washes?
Effects of damaged skin?

WHAT COLOUR IS YOURS?

E. coli Bacteraemia England 2015/16

RMH E.coli Unfriendly tool

Local Actions at The Royal Marsden

Teams across the UK have been meeting the challenge of gram negative blood stream infection reduction in different ways with projects targeting local populations and looking at different aspects of care. Much of the work has focussed on improving hydration and use of bladder instrumentation.

A group of cancer centres in England including the Royal Marsden, The Christie and The Clatterbridge Cancer Centre are collaborating on work to fully establish the risk factors for *E.coli* blood stream infection in the oncology patient. These patients have higher than average rates of *E.coli* BSI compared with non-cancer patients.

A data set has been refined to include aspects of cancer care that may impact on a persons likelihood of developing E.coli BSI. This includes use of chemotherapy, immunotherapies, radiotherapy, tumour group, presence of mucositis or graft versus host disease, and invasive device use. Data collection has commenced in the 3 dedicated cancer units and 2 Trusts with cancer centres. The plan is to build a single (anonymised) data set to power the results.

A Darzi fellow has been recruited to focus for a year on *E.coli* reduction in cancer patients, The Darzi fellowship project uses quality improvement training to bring about behaviour change.

We have also been raising awareness and knowledge across the Trusts about *E.coli* and enhancing patient education via a new HEALTHY care leaflet and provision of comfort pack.

We are also developing & trialling a new ward '*E.coli* unfriendly' assessment tool and a patient *E.coli* care bundle

Conclusions

Until April 2017, *E. coli* bloodstream infections were increasing at a rate of 6-8% per annum
This year the rise has slowed to 1% which while far from the requested 10% reduction, represents a stalling of growth. We will continue to focus on reducing catheter use, improving hydration and safety netting elderly patients presenting with UTI to ensure they are effectively treated.
Collaborative work being undertaken in the UK Cancer Centres will increase our understanding of risk factors in the oncology population.

References:
Ferenicovich E et al, ICHE 2008 1124 – 1131
Al-Hassan m et al, Clin microbial infect 2009: 15
Abernathy, J et al 2017 JHI 95 (4)
Stolbrink M et al, 2015 J Hospital Infection 88(1), 34-39
Quinn et al, Journal of Nursing Scholarship 2014; 46:1, 11-19
Garcia R., Infection Prevention 2013, London (presentation)
Kotay S et al Applied Environmental Microbiology April 2017
Grabowski M et al. Journal of Hospital Infection April 2018
Garvey M et al, AJIC Oct 2017
Hopman J et al antimicrobial Resistance and Infection Control June 2015