



Public Health
England

NHS

Improvement

Preventing healthcare associated Gram-negative bloodstream infections: an improvement resource

May 2017

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Delivering better healthcare by inspiring
and supporting everyone we work with,
and challenging ourselves and others to
help improve outcomes for all.

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Foreword



The Secretary of State for Health has launched an important ambition to reduce healthcare associated Gram-negative bloodstream infections by 50% by 2021 and reduce inappropriate antimicrobial prescribing by 50% by 2021. Gram-negative bloodstream infections are believed to have contributed to approximately 5,500 NHS patient deaths in 2015.

We know the ambition is challenging, but if we can achieve these reductions the benefit to patients and the whole population is immense.

NHS Improvement and Public Health England have co-produced this improvement resource with colleagues across the health economy, including those working on the front line. Our initial focus is on reducing *Escherichia coli* bloodstream infections because they represent 55% of all Gram-negative bloodstream infections but we will continue to develop the resource as we come to understand the most effective interventions.

I hope our combined efforts across the health economy will mirror the impressive progress in reducing the numbers of meticillin-resistant *Staphylococcus aureus* and *Clostridium difficile* infections which have fallen by 57% and 45%, respectively, since 2010.

I welcome your continued feedback at improveipc@nhs.net.

Ruth May

Executive Director of Nursing, NHS Improvement and National Director of Infection Prevention and Control

Introduction

This improvement resource will help health and social care economies reduce the number of Gram-negative bloodstream infections (BSIs) with an initial focus on *Escherichia coli* (*E.coli*).

We have made suggestions rather than prescriptions about how to reduce these infections and pulled together a collection of tools for local teams. We recognise that effective prevention of infection is multifaceted and requires strong leadership, effective training programmes, and evidence-based guidelines and interventions. Leadership and accountability are key in focusing on this agenda and pulling together partners across health and social care to collaboratively deliver the ambition.

We have grouped the [resources](#) under:

- essential practice standards (including prevention of sepsis)
- antimicrobial stewardship (AMS)
- focus of infection:
 - a. urinary tract
 - b. catheter associated urinary tract
 - c. skin or soft tissue, including ulcers or cellulitis
 - d. intravascular access associated
 - e. surgical interventions
- patient information
- education and training
- incentives
- surveillance.

If you notice there are resources missing please let us know at nhsi.improveipc@nhs.net

Thank you to all the colleagues from various settings and organisations across the healthcare economy in England who collaborated in developing this improvement resource.

Key developments

2011	Chief medical officer calls for antimicrobial resistance (AMR) to be added to risk register.
2011	Enhanced surveillance of <i>E. coli</i> BSIs is mandated
2013	5-year UK AMR strategy recognises need for systematic high quality infection prevention and control.
2015:	WHO Global Action Plan to reduce AMR
2016	Publication of the O'Neill review on AMR reports the 'human and economic costs' ¹
2016	November 2016: The Secretary of State launches new plans to reduce infections in the NHS and halve the number of Gram-negative BSIs by 2020.
2017	Launch of the improvement resource

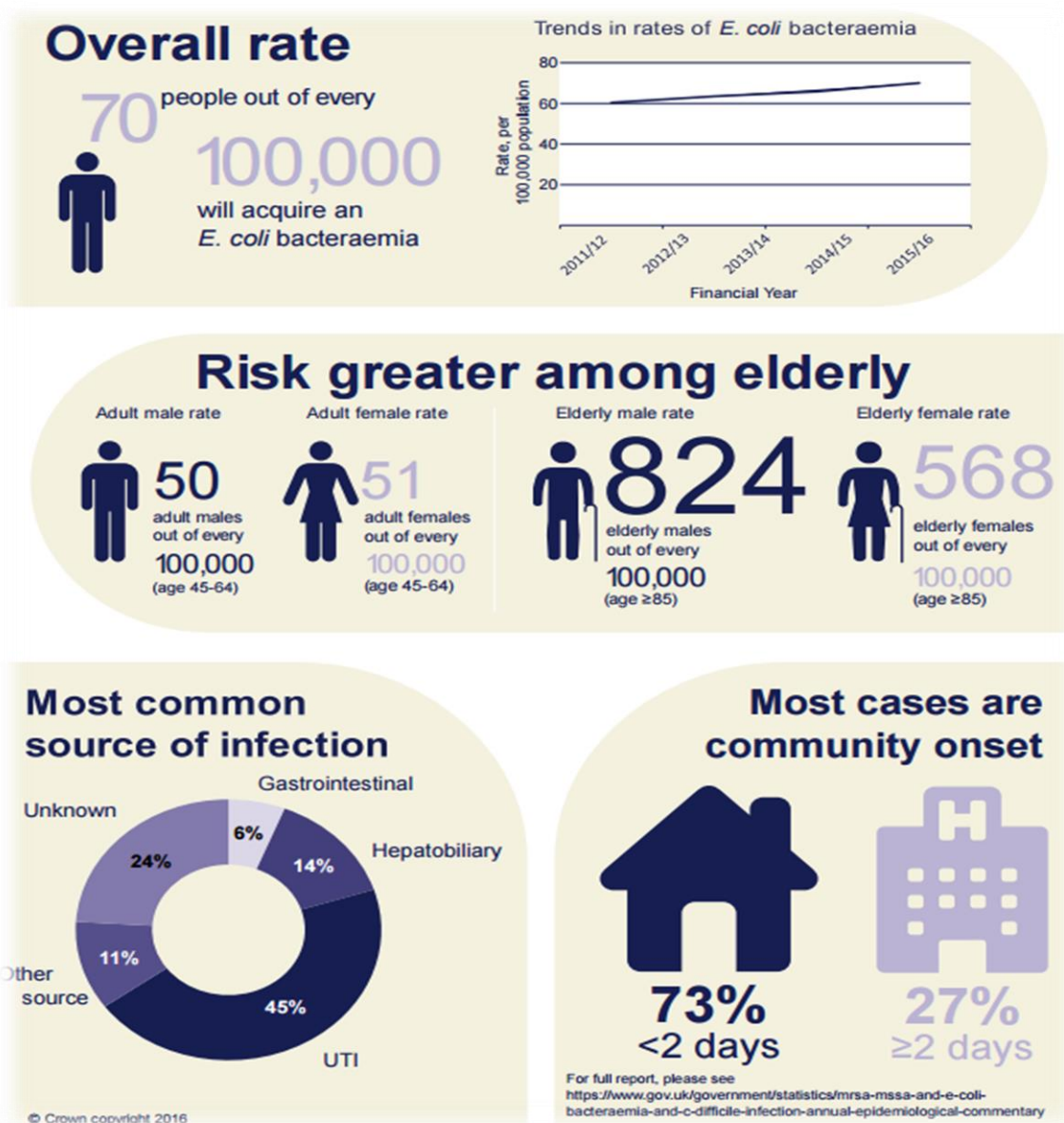
A multitude of strategies and interventions have been implemented in England, which have had a significant impact on reducing meticillin-resistant *Staphylococcus aureus* (MRSA) blood stream infections and *Clostridium difficile* infection (CDI) and these are summarised in the Health Foundation report [Infection prevention and control: lessons from acute care in England](#).

¹ <https://amr-review.org/>

Background

There are key facts and figures about *E.coli* bloodstream infections in Figure 1 from Public Health England (PHE). PHE also provides [resources](#) such as guidance, data and analysis about common sources of *E.coli* BSIs across England in 2015/6 while its [Fingertips tool](#) allows quick review of data on *E.coli* BSI counts and rates in your local area, at individual trust or clinical commissioning group (CCG) level.

Figure 1. *E.coli* bloodstream infections in England 2015/16



Approximately three-quarters of *E. coli* BSIs occur before people are admitted to hospital. Reduction therefore requires a whole health economy approach. Local system leaders will need to agree the best approach to achieve these reductions in their area.

Clinical commissioning groups (CCGs) are leading on achieving the Quality Premium (from April 2017, for two years), aiming to reduce all *E. coli* BSIs by 10% in Year 1.

Health and social care workers will need to be supported to prevent infections for all their patients, at every opportunity. This will require leadership to ensure frontline workers have the knowledge, skills and resources to deliver high quality care.

The importance of reducing *E.coli* bloodstream infections

Concerns

We have seen an increase in the number of *E.coli* bloodstream infections despite decreases in MRSA bloodstream infections and CDI infections: a total of 38,132 cases of *E. coli* bacteraemia were reported by NHS trusts in England between 1 April 2015 and 31 March 2016. The importance of and challenges in reducing *E.coli* BSI are clearly outlined in the [enhanced sentinel surveillance programme](#) which showed that the most common source of infection is the urogenital tract at 51.2% (see Figure 2). Therefore targeting urinary tract infections could have a significant impact in reducing the number of healthcare associated infections. The challenge will be working across the health and social care system to reduce these infections.

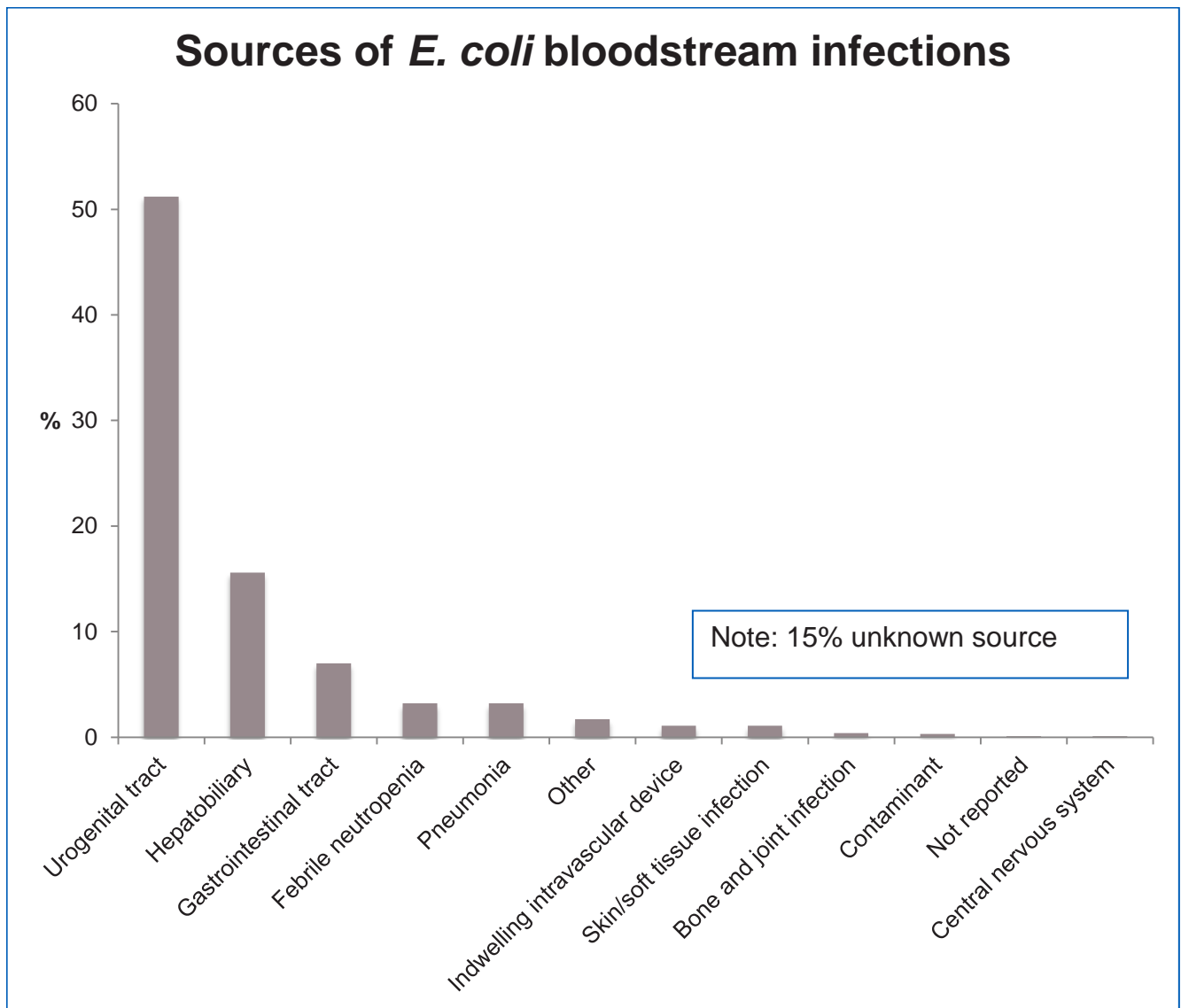
Benefits

Benefits include:

- improved [patient safety](#) through reduced infection rates, [mortality](#), length of stay and [appropriate antimicrobial prescribing](#)
- improved patient experience through the prevention of avoidable infections and reduced length of inpatient stay
- improved population health through reduced [antimicrobial resistance](#)
- potentially between £900-£2400 per patient saved for each *E.coli* BSI prevented ([data from European study](#) and [NHS reference costs](#))

These benefits align with the [NHS England CCG improvement and assessment framework](#).

Figure 2. Sources of *E.coli* bloodstream infection



Based on Abernathy, J et al (2017) [Epidemiology of *Escherichia coli* bacteraemia in England, Results of an enhanced sentinel surveillance programme. *Journal of Hospital Infection* 95 \(4\): 365-375](#)

Suggested actions across the whole health economy

For 2017/18 we are focusing on reducing healthcare associated *E. coli* bloodstream infections because they represent 55% of all Gram-negative BSIs.

Suggested actions to reduce *E.coli* BSIs based on stakeholder consultation and case studies

CCGs to provide leadership in delivering the Quality Premium:

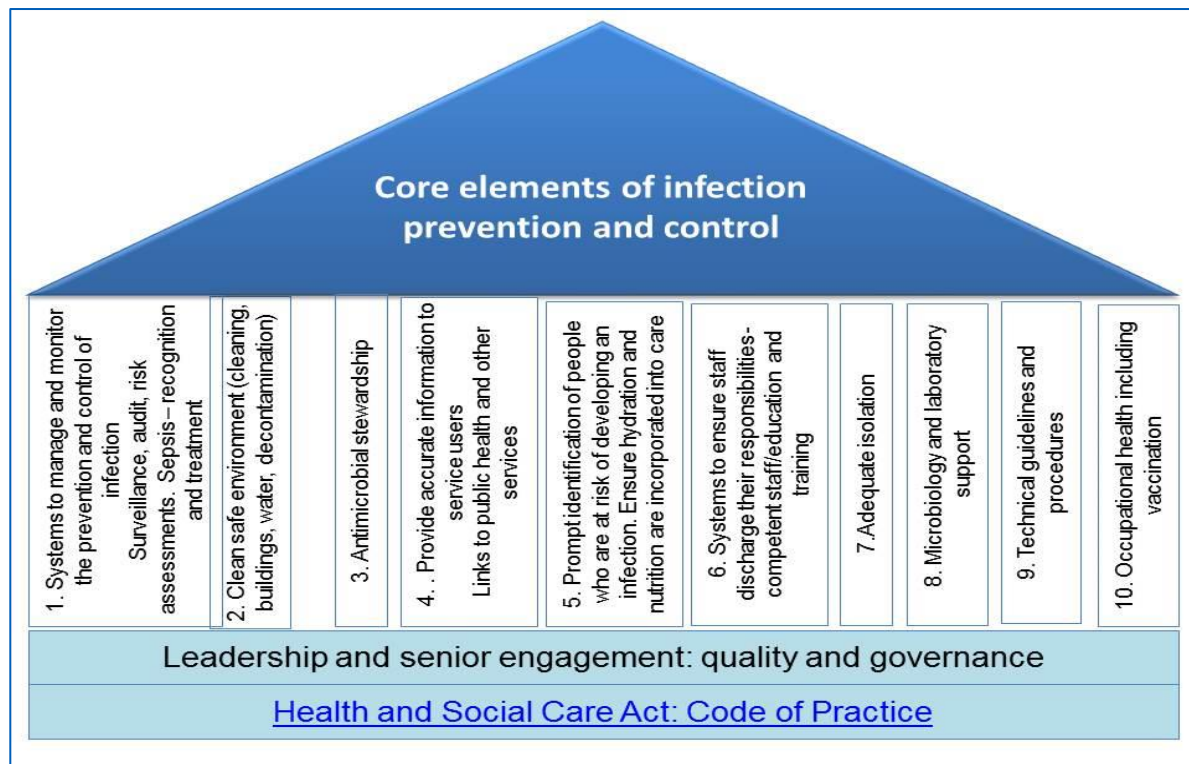
- All partner organisations review their approach to reducing *E.coli* BSI by carrying out a self-assessment of progress against core standards.
- Local data is reviewed to understand up-to-date [surveillance activity](#)
- A sufficient sample of patients with *E.coli* BSIs are reviewed to determine whether there are common themes that could help you identify priority areas for action. (Appropriate sample size will depend on the incidence of *E.coli* BSIs in your area and diversity of causes. A starting point would be to review 30 cases.)
- An improvement plan is developed based on the preceding assessments.
- Progress is reviewed by monitoring [local surveillance activity](#), comparing findings with subsequent case reviews and repeating local audits (such as high impact interventions).

Identifying priority areas for action

Carrying out a self-assessment and improvement review may help you develop a local action plan that encompasses the full range of activities and behaviours as outlined in figure 3 that are necessary across all levels of an organisation or health economy.

Actions once the focus of infection is identified

Figure 3. Core elements of infection prevention and control



Focus of infection	Suggested guidance/action
Urinary tract or catheter associated urinary tract	Bladder scanners Urinary catheter high impact intervention Catheter passports Appropriate recognition and treatment of urinary tract infections
Related to surgery, particularly hepatobiliary	Surgical site infections high impact intervention NICE prevention of surgical site infections Appropriate treatment of Infection – Follow national guidelines (Start Smart then focus)
Gastrointestinal causes, particularly related to surgical interventions	NICE guidelines on gastrointestinal infections Surgical site infection high impact intervention NICE Prevention of surgical site infection
Intravascular devices	Central venous catheter or peripheral vascular catheter high impact intervention Epic 3
Patients are vulnerable to infection	Continence care Appropriate isolation Management of related comorbidities Hydration
Skin or soft tissue including ulcers or cellulitis	Aseptic technique in wound management Appropriate abscess management NICE guideline on diabetic foot problems Prevention of pressure damage
Respiratory tract	Ventilation-associated pneumonia high impact intervention (if intubation related) NICE guidelines on respiratory tract infections

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