Escherichia coli (E. coli) blood stream infection reduction strategy for Lancashire

Lancashire County Council

www.lancashire.gov.uk

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1.0 Introduction

There is a growing concern from infection prevention professionals, and those working within the health quality and safety arenas, regarding the increasing numbers of Gram-negative bloodstream infection; especially as these bacteria are becoming increasingly resistant to mainstream antibiotics. To address this concern the reduction of *Escherichia coli* bloodstream infections was included as a Quality Premium for the first time for 2017-19.

Gram-negative bacteria cause infections including pneumonia, bloodstream infections, wound or surgical site infections, and meningitis in healthcare settings.

The ultimate aim is to reduce all Gram-negative bloodstream infections by 50% by 2021, but initially the focus is on reducing healthcare associated *Escherichia coli* bloodstream infection as they represent up to 65% of all Gram-negative bloodstream infection. During 2017/18 the Clinical Commissioning Groups are challenged to reduce the number of *Escherichia coli* bloodstream infections by 10% using the 2016 calendar year as the baseline data.

There are many sources for *Escherichia coli* infection; the most common being urinary tract infections (45%) and hepatobiliary (14%). The majority of cases (73%) are community onset. The actions which fall out of this strategy are concentrated on these areas for improvement. The focus for this strategy is reducing *Escherichia coli* infections and the risk of developing a subsequent bloodstream infection, but the actions will potentially impact on reducing all Gram-negative infections.

This strategy has been developed in collaboration with Acute Trusts, Public Health England, Clinical Commissioning Groups, and NHS England's local quality leads to support the work to achieve the required reduction in cases. The subsequent action plans have had support from the local care homes and Advancing Quality Alliance.

2.0 Background

2.1 Gram-negative bacteria and E coli

Gram-negative bacteria, such as *Escherichia coli* (E. coli), *Klebsiella* and *Pseudomonas* cause infections including pneumonia, bloodstream infections, wound or surgical site infections, and meningitis in healthcare settings.

These bacteria are becoming increasingly resistant to most available antibiotics making the infection more problematic to treat[1]. During 2016/17, 5,738 people in the UK died within 30 days of a positive blood culture with an E. coli bloodstream infection (BSI)[2]. The risk is increased by 30% if the BSI is caused by a resistant E. coli[3]. Gram-negative bloodstream infections (GNBSI) are set to cost the NHS £2.3 billion by 2018[4], making the need to prevent avoidable morbidity and mortality associated with E. coli BSI evident.

In 2016 the Health Secretary launched plans to halve the number of healthcare associated GNBSI by 2020. E. coli BSI represent up to 65% of the GNBSI, therefore these are the focus for 2017/19[5]. Whilst there are many sources for E. coli infection the most common are urinary tract infections (45%) and hepatobiliary (14%). The majority of cases (73%) are community onset.

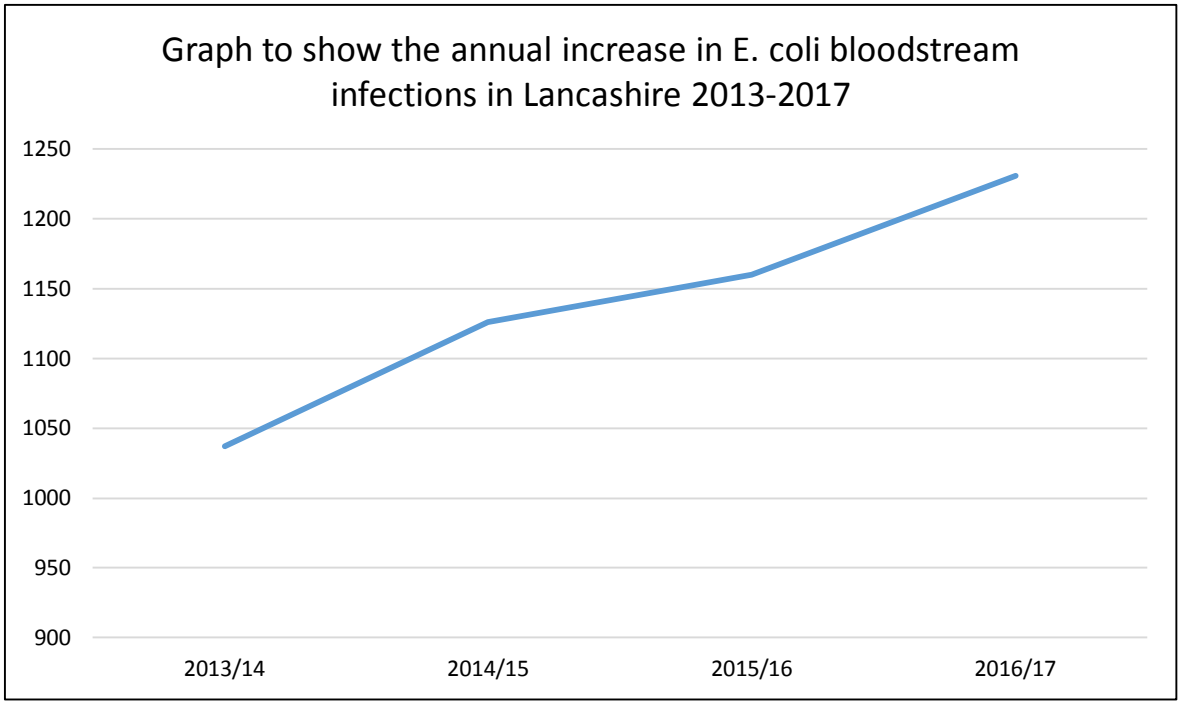
2.2 Prevalence of E. coli bloodstream infections

There has been a sustained year-on-year increase in the number of *E. coli* BSI with the overall rate of E. coli BSI in England, Wales and Northern Ireland increased by

[1]Gram-negative Bacteria Infections in Healthcare Settings https://www.cdc.gov/hai/organisms/gram-negative-bacteria.html
[2]Thirty-day all-cause fatality subsequent to MRSA, MSSA and *E. coli* blood stream infection and *C. difficile* infection, 2016/17 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/637436/HCAI_thirty_day_all_cause_fatality_report_2016_2017.pdf
[3] Public Health Matters blog. Beating E.coli - what are you doing to break the chain of infection? https://publichealthmatters.blog.gov.uk/2016/10/16/beating-e-coli-what-are-you-doing-to-break-the-chain-of-infection/
[4] Reducing infections in the NHS https://www.gov.uk/government/news/reducing-infections-in-the-nhs
[5] Reducing infections in the NHS https://www.gov.uk/government/news/reducing-infections-in-the-nhs

45% between 2009 and 2016 and 25% between 2012 and 2016. The highest rates are observed in males and females 75 years or older[6].

This increase has been replicated locally and the following graph shows the increase in numbers of E. coli BSI in Lancashire (including Blackburn with Darwen and Blackpool) since 2013.



The following graphic from Public Health England emphasises the demographics of those at risk from acquiring an E. coli BSI.

[6] Laboratory surveillance of *Escherichia coli* blood stream infection in England, Wales and Northern Ireland: 2016 Volume 11 Number 18 Published on: 22 May 2017 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/618299/hpr1817_ecoli_crrctd.pdf

[7]

[7] *Escherichia coli* (E. coli) blood stream infection: headline information financial year 2016 to 2017 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/625212/E_coli_infographic_2017.pdf

3.0 The Quality Premium

As part of the next steps for the NHS Five Year Forward the key area for improvement for 2017/19 focus on patient safety[8]. The aim is to make the same progress on GNBSI by building on previous success in reducing Meticillin Resistant *Staphylococcus Aureus* BSI and *Clostridium difficile* infections.

The Quality Premium is intended to reward clinical commissioning groups (CCGs) for improvements in the quality of the services that they commission and associated improvements in health outcomes. The Quality Premium 2017-19 includes the reduction of E coli BSI for the first time[9]. This Quality Premium has three elements linked to the reduction of GNBSIs and inappropriate antibiotic prescribing in at risk groups.

NHS Improvement have collated the national guidance and resources to assist CCGs to achieve their Quality Premium[10]. This resource suggests that the benefits, aligning with the NHS England CCG improvement and assessment framework, 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

This resource also recommends that:

- CCGs provide leadership to reduce E.coli BSI by 10%

[8]The next steps for the Five Year Forward can be accessed at https://www.england.nhs.uk/five-year-forward-view/next-steps-on-the-nhs-five-year-forward-view/patient-safety/

[9] Technical Guidance Annex B Information on Quality Premium https://www.england.nhs.uk/wp-content/uploadzs/2016/09/annx-b-quality-premium-14-07-17.pdf

[10] Preventing healthcare associated Gram-negative bloodstream infections: an improvement resource https://improvement.nhs.uk/uploads/documents/Gram-negative_IPCresource_pack.pdf

- Local data is reviewed to understand up to date surveillance data
- All partner organisations review approach to reducing BSI by carrying out self-assessment of progress against core standards
- Review of a sample of E.coli BSI to determine common themes
- Develop improvement plan of preceding assessments
- Monitor progress through local surveillance and compare findings with subsequent case reviews

The NHS Improvement letter dated 28th June 2017 to Directors of Nursing, Medical Directors and CCG Accountable officers requested commissioners and providers to:

- discuss and agree a reduction plan using existing groups, such a Quality Surveillance Groups or Sustainability and Transformation Partnerships
- jointly develop an improvement plan
- identify Executive leads in Acute Trusts and CCGs

Performance Improvement Network events are also being arranged for health economies to share and learn from each other.

4.0 Reducing E coli

The government's plans to prevent NHS infections include:

- more money for hospitals with a new £45 million quality premium;
- Care Quality Commission inspections focusing on infection prevention based on E. coli rates and taking action against poor performers;
- the NHS publishing staff hand hygiene indicators for the first time;
- displaying E. coli rates on wards, making them visible to patients and visitors;
- improving training and information sharing so NHS staff can learn from the best in cutting infection rates; and
- appointing a new national infection lead

These plans also contribute to the government's commitment to tackle antimicrobial resistance. Targeting preventable infections like E. coli helps to make surgeries and care homes safer for patients and reduce the need for antibiotics, therefore reducing the opportunity for infections to develop a resistance to them.

Most actions are focused on the Acute Trusts, but it is essential that they are mirrored in the community, especially as that is the arena where the majority of these infections arise. Infection rates can be cut with better hygiene and improved patient care, such as ensuring staff, service users and visitors regularly wash their hands. People using devices such as catheters, are at risk from developing E. coli infections if they are not inserted properly, left in too long or if they are not properly hydrated[11].

Every infection prevented reduces the need for and use of antibiotics, which in turn lessens the potential development of resistance. Everyone has a role to play in this whether we work in health and social care or are members of the public.

[11] Reducing infections in the NHS https://www.gov.uk/government/news/reducing-infections-in-the-nhs

4.1 Breaking the chain of infection

There are certain conditions that need to be met for a microorganism to cause an infection, involving the microorganism, hosts and environment.

There must be a reservoir, a portal of exit from one host, a mode of transmission and a portal of entry to a new susceptible host. These steps are called the chain of infection. If one or more links are broken, the infection will be prevented (see graphic below)[12]. Health and social care workers play a vital role in breaking this chain.

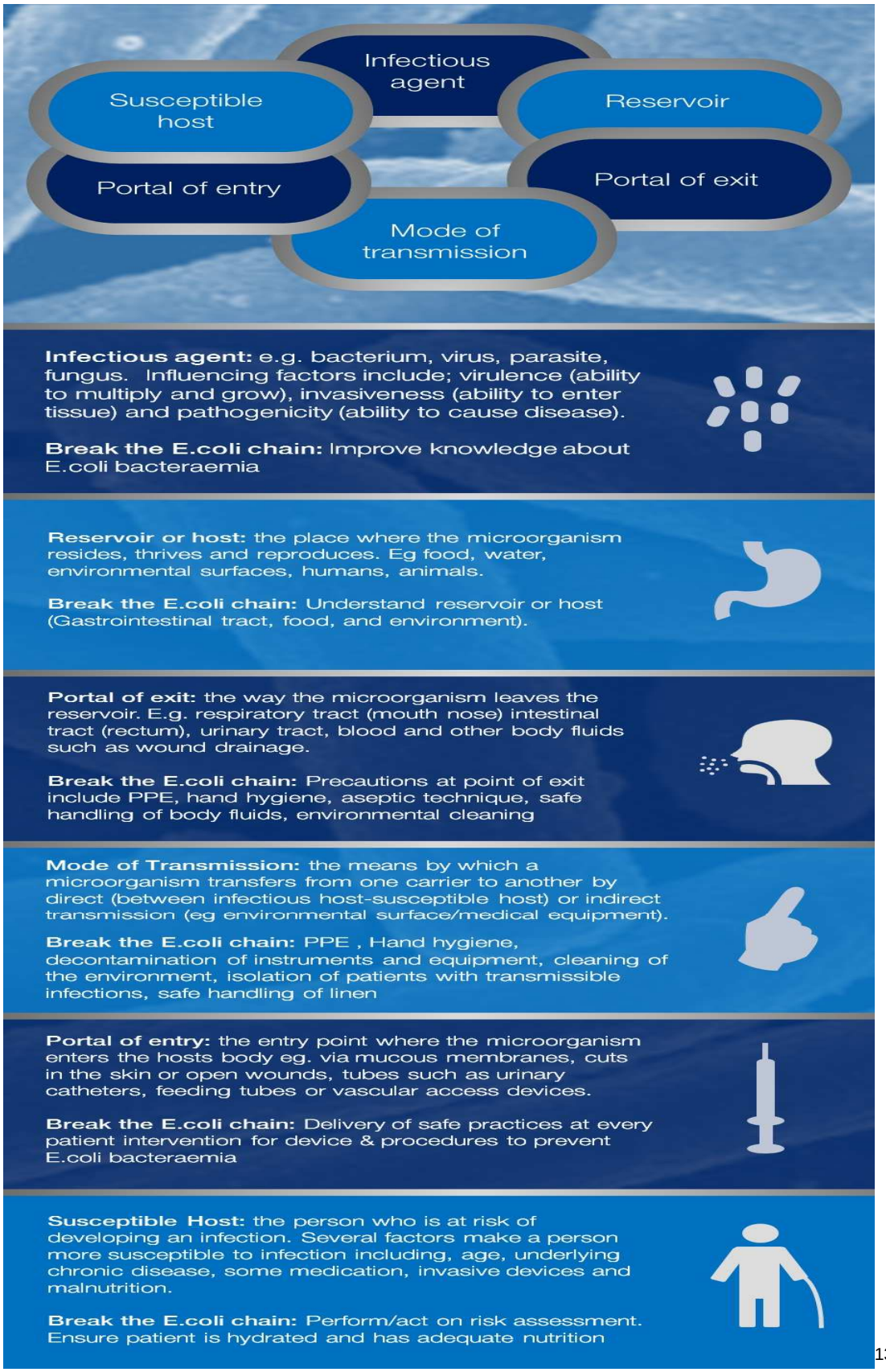
We need to develop a better understanding of the epidemiology of E.coli, the reservoir and how it is transmitted.

The reservoir for E coli is often the gastrointestinal tract, but it could be food or the environment. Excretion will be the portal of exit and preventing contamination of the environment by safe handling and disposal of body fluids could reduce the risk. Using appropriate PPE, hand hygiene and aseptic technique for all dressings should help to break the mode of transmission.

Catheter insertion and maintenance can be a portal of entry and therefore a risk assessment of their need must be reviewed daily.

Risk assessment of the service user and identifying if they are a susceptible host could also help to break the chain.

[12] Beating E.coli - what are you doing to break the chain of infection https://publichealthmatters.blog.gov.uk/2016/10/16/beating-e-coli-what-are-you-doing-to-break-the-chain-of-infection/



[13]

[13]Beating E.coli - what are you doing to break the chain of infection https://publichealthmatters.blog.gov.uk/2016/10/16/beating-e-coli-what-are-you-doing-to-break-the-chain-of-infection/

5.0 Development of the Action Plans to meet the Quality Premium

In addition to improving generic infection prevention protocols NHS Improvement[14] suggested the following guidance and actions. These have been incorporated into the local action plans.

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

[14]Preventing healthcare associated Gram-negative bloodstream infections: an improvement resource https://improvement.nhs.uk/uploads/documents/Gram-negative_IPCresource_pack.pdf

6.0 Working with partners across the health economies in Lancashire to address E. coli blood stream infection

The Infection Prevention Nurses at Lancashire County Council will support the CCGs to develop action plans to reduce E. coli BSI. The action plans incorporate generic and specific actions for the CCGs and the health and social care economy.

The Infection Prevention Nurses will provide specialist training, advice and support as necessary.

7.0 Appendices - Appendix A – GP letter

Dear colleague,

***Escherichia coli* (E. coli) BSI reduction strategy**

There is a growing concern from professionals working within infection prevention regarding the increasing numbers of Gram-negative bloodstream infections (GNBSI) especially as many of these bacteria are resistant to several antibiotics. Currently there is a lack of epidemiology to guide future prevention work streams, therefore it is recommended that post infection reviews are performed of any new cases. It is anticipated that these reviews will take place during Quarters 2/3 and the data will be analysed during Quarter 4. This analysis will be fed back to the CCGs/GPs during Quarter 1 2018/19.

These infections are set to cost the NHS £2.3 billion by 2018; in 2016 the Health Secretary launched plans to halve the number of healthcare associated GNBSI by 2021[15]. E. coli bloodstream infections represent up to 65% of all GNBSI and initially the focus is on reducing healthcare associated E. coli bloodstream infections. During 2016 5,738 people with an E. coli BSI died within 30 days of a positive blood culture[16].

In 2017, the reduction of E. coli blood stream infection was included as a Quality Premium for the first time[17]. The Quality Premium rewards CCGs for improvements in the quality of the services that they commission and for associated improvements in health outcomes. The CCGs are challenged to reduce the number of E. coli bloodstream infections by 10% using the 2016 calendar year as the baseline.

The CCG is requesting your support by asking you to complete the attached form and return to XXXX

The LMC has been consulted and support this work.

[15] Reducing infections in the NHS https://www.gov.uk/government/news/reducing-infections-in-the-nhs
[16] Thirty-day all-cause fatality subsequent to MRSA, MSSA and *E. coli* blood stream infection and *C. difficile* infection, 2016/17 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/637436/HCAI_thirty_day_all_cause_fatality_report_2016_2017.pdf
[17] Technical Guidance Annex B Information on Quality Premium https://www.england.nhs.uk/wp-content/uploadzs/2016/09/annx-b-quality-premium-14-07-17.pdf

Appendix B

E.COLI BLOODSTREAM INFECTION: POST INFECTION REVIEW TOOLKIT

The purpose of this toolkit is to help staff conduct their post infection review in the case of an e-Coli bloodstream infection. Some sections may be more relevant than others, and staff are encouraged to exercise their discretion/clinical judgement in completing the form.

Case Details

DCS Identifier:	Reporting Organisation:
Specimen Date:	Primary Focus Of Blood stream infection:
Is this Hospital Onset blood stream infection?	

Patient Details

Forename:	Surname:
Date of Birth:	Age:
GP Practice:	GP Practice code:
NHS Number:	Sex:
Diabetic?	COPD?
Other Co-morbidities	

Hospital Admissions (28 days prior to this blood stream infection case)

Hospital care	Was it a NHS commissioned care? Please name:	Date admitted

Risk Factors (28 days prior)

Device	Date Inserted	Date Removed	Date Manipulated
Vascular Device			
Surgery (or 12Months Prosthetic Material)			
Hepatobiliary Procedure (ERCP or MRCP or Similar)			
Urinary Catheter (including Intermittent or Temporary)			
Open Wounds or Ulcer (excluding Diabetic Foot Infection)			
Diabetic Foot Ulcer or Infection			

Contact (circle relevant)	Yes / No	From / To	Period of time
Continence clinic			
Podiatry/leg ulcer/diabetic foot clinic			
Nursing/residential care/sheltered housing			
Respite care			
Other organisation relevant to the case			

Antibiotic History (Prescribed by GP 28 Days Prior)

Antibiotic	Indication	Start date	Stop date	Duration	Dose