Escherichia coli bloodstream infection related to urinary tract infection associated with community- acquired pneumonia in elderly patients in Central Lancashire

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Introduction

- In 2017, NHS Improvement announced a national ambition to reduce healthcare associated Gram negative bloodstream infections (GNBSIs) by 50% by March 2021, with the focus on *E. coli* bacteraemia in 2017/2018.
- The commonest source of *E. coli* BSI reported in Public Health England (PHE) mandatory surveillance is the urinary tract.
- National initiatives to reduce *E. coli* BSI have focused on catheter-associated urinary tract infection (CAUTI) and improving hydration.

Aim

To describe the clinical characteristics of UTI-related *E. coli* bloodstream infections (BSIs) in Central Lancashire to identify targets for intervention to reduce the incidence of *E. coli* BSI

Methods

Setting: Central Lancashire health economy provides primary, acute and community healthcare for the Preston and Chorley area of Lancashire. Lancashire Teaching Hospitals NHS Foundation Trust (LTHTR) is the acute care provider in Central Lancashire and comprises the Royal Preston Hospital and Chorley District Hospital. LTHTR provides a range of specialist services to Lancashire and South Cumbria.

Data collection: Retrospective reviews of all *E. coli* bloodstream infections (BSIs) reported during 4 months: October 2017, January 2018, April 2018 and May 2018. Data collected included patient demographics; clinical characteristics including the most likely source. For patient with UTI-related *E. coli* BSIs with concurrent pneumonia further social and clinical details were extracted.

Definitions: Community onset, Hospital onset, Community acquired, Healthcare associated were as defined in Public Health England guidance.

Urinary tract source was where there was a positive *E. coli* urine culture and/or clinical evidence of an infection source in the urinary tract as the most likely source.

Patients were considered to have concurrent community acquired pneumonia when there was radiological evidence of pneumonia on admission or where there were clinical details indicating pneumonia.

Data sources: Clinical records including case notes, electronic patient records, laboratory information system, Clinical microbiology notes. North West Ambulance records.

Data analysis: Data was collated and analysed in Microsoft Excel®

Results

Source of *E. coli* BSIs
During the months October 2017;January 2018; April 2018; May 2018 there were 109 *E. coli* BSIs; 92/109 (84.4%) were community onset. The mean age was 71.9 years (range 21-98 years) and 60/109 (55%) were male. Figure1 shows the underlying source.

UTI-related *E. coli* BSIs
61/109 *E. coli* BSIs were UTI-related with a mean age of 72.6 years (range 21-95 years) and 33/61 (54%) were female. 8/61 (13%) were CAUTI.   Figure 2 shows the clinical characteristics of the UTI- related *E. coli* BSIs.

Patients with UTI-related *E. coli* BSIs and concurrent community-acquired pneumonia.
Review of the UTI-related *E. coli* BSIs identified a cohort of 15/61 (24.6%) patients who had concurrent community-acquired pneumonia. 14/15 cases (93.3%) had community onset *E. coli* BSI. Mean age 82.0 years (range 66-91 years) and 9/15 (60%) were female. Table I show the characteristics of the patients
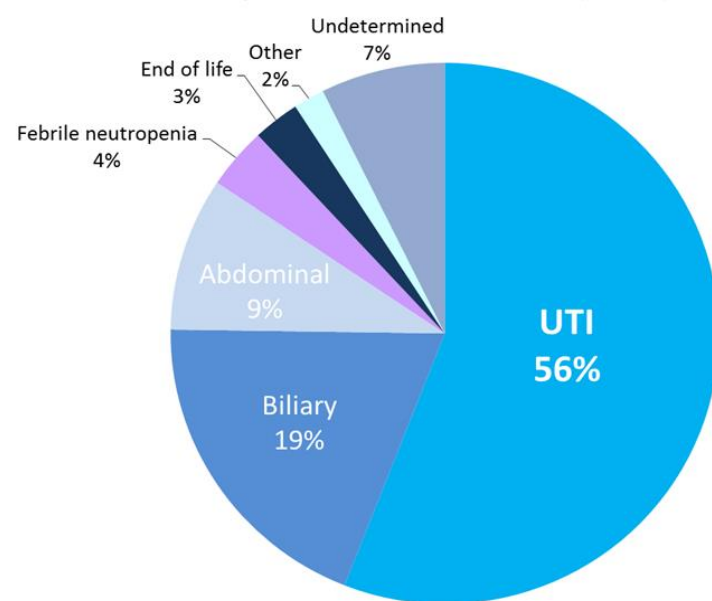

Figure 1 Source of *E. coli* BSIs (n=109)

UTI 56%
Biliary 19%
Abdominal 9%
Febrile neutropenia 4%
End of life 3%
Other 2%
Undetermined 7%

Figure 2 Urinary tract source in UTI-Related *E. coli* BSI (n=61)

Pyelonephritis, CAUTI, Transplant pyelonephritis, Bladder carcinoma, Nephrostomy-associated, Post TRUS biopsy, Post childbirth, Febrile neutropenia, Recent urological surgery, Colovesical fistula, Renal obstruction

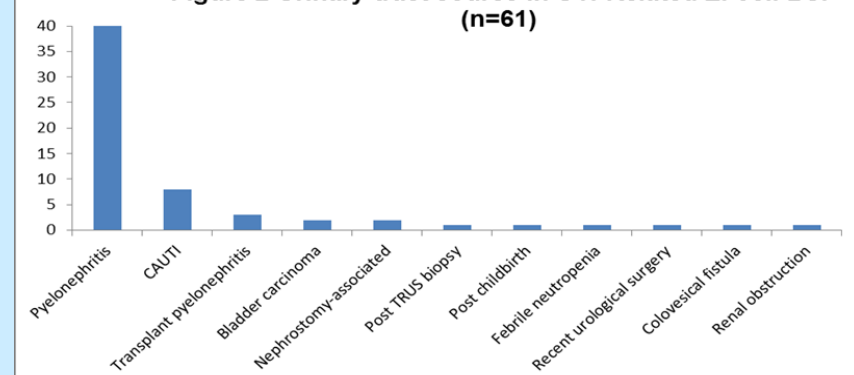### Table I Characteristics of patients with concurrent UTI-related *E. coli* BSI and community-acquired pneumonia (n=15)

	No.	(%)
UTI Source		
Pyelonephritis	13	(86.7)
CAUTI	2	(13.3)
Residence		
Nursing Home	5	(33.3)
Lives alone	5	(33.3)
Lives with carers	5	(33.3)
Comorbidities		
Pre-existing lung disease (COPD)	4	(26.7)
Diabetes mellitus	3	(20.0)
Malignancy	3	(20.0)
Recent hospital admission *	5	(33.3)

* 66.7 % were community onset community acquired

Conclusions

- Identifying targets for intervention to reduce *E. coli* BSI across the health economy is challenging and requires significant resources.
- Patients with UTI-related *E. coli* BSI and concurrent community acquired pneumonia had a higher mean age, were predominantly female and the majority were community onset and community acquired and not healthcare-associated.
- The range of clinical characteristics of UTI- related *E. coli* BSIs were diverse.
- Identifying the single most likely source of *E. coli* BSI will not identify other potential contributing factors.
- Reducing CAUTI will have a small impact on the overall incidence of *E. coli* BSI in Central Lancashire.
- Detailed studies across the health economy are required to better understand the epidemiology of *E. coli* BSI to identify interventions for reduction.

References
- Wilcox MH. The start of another infection prevention learning curve: reducing healthcare-associated Gram negative bloodstream infections. *J Hosp Infect* 2017; 97: 205-206; Public Health England. Mandatory Enhanced MRSA, MSSA and Gram-negative bacteraemia, and *C. difficile* surveillance. Protocol version 4.1. March 2017; Public Health England. *Clostridium difficile* infection Surveillance updates. May 2017