

# How to Achieve a 50% Reduction in Healthcare Associated Gram Negative Bloodstream Infections (HA-GNBSIs) over 5 Years

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## INTRODUCTION

*Escherichia coli* (*E. coli*) causes more than one-third of the bacteraemia cases in England each year, and the incidence of these infections is rising<sup>1</sup>. In May 2017 the Secretary of State for Health launched an ambition to reduce HA-GNBSIs by 50% by 2021 in England. We present our approach to reduce HA-GNBSIs in adults.

## METHODS

We set up a Working Group, comprising Specialist Nurses, Consultants, Pharmacists and Managers from Acute, Commissioning and Community Provider Trusts, a General Practitioner and a Nursing Home Manager. The group meets every two months and is chaired by a Consultant Microbiologist from the Acute Trust.

Based on guidance from NHS Improvement<sup>2</sup>, we:

- Conducted a baseline audit to guide our strategy.
- Established initiatives already underway to reduce GNBSIs, although not necessarily designed for this purpose, mainly in prevention of urinary tract infections (UTIs).

With the help of the local Clinical Commissioning Groups' Steering Group, we were able to share best practice, and prioritise activities.

Using 2016 baseline data for *E. coli* BSIs, we set trajectories to achieve a 10% reduction in 2018-19 and a 50% reduction by 2021.

## RESULTS

### Baseline audit findings:

- All *E. coli* BSIs in May and June 2017 were reviewed retrospectively; *E. coli* comprise the majority of GNBSIs. Of the 45 *E. coli* bacteraemias assessed, 6 (13.3%) were acute Trust-attributed, and 39 (86.7%) were community-attributed.
- The largest numbers of *E. coli* BSIs were due to urinary tract infections (19, 42.2%), followed by unknown (10, 22.2%).
- The largest comorbidity was diabetes (10/45, 22.2%) followed by previous UTI (8/45, 17.8%), and urostomy (4/45, 8.9%).
- Risk factors included:
  - Catheterisation (6/19, 31.6% of patients with UTI)
  - Prior and current antibiotics (18/45, 40.0%), co-amoxiclav and ceftriaxone being the most frequently used, which were in line with the Acute Trust policy
  - Extended Spectrum Beta-Lactamase (ESBL)-producing bacteria (14/45, 31.1%). Of the 14 patients, six received appropriate antibiotics, based on susceptibility data, and there was no information for eight patients.
- On the basis of the audit findings, we agreed that our priorities would be:
  - Prevention of recurrent UTIs
  - Prospective root cause analysis for cases of "unknown" source
  - Education of staff
  - Information for patients
  - Surveillance of infections and patterns of antimicrobial resistance.
- We considered testing urine samples earlier in the UTI pathway for high-risk patients in general practice, to guide appropriate antibiotic use earlier. Currently national guidance for uncomplicated urinary tract infections is to test a urine sample only if first-line empirical treatment fails. Since earlier testing would have a major impact on clinical practice and on funding required, we approached both the Acute and Community Trusts to explore conducting a research study.

### Initiatives already under way:

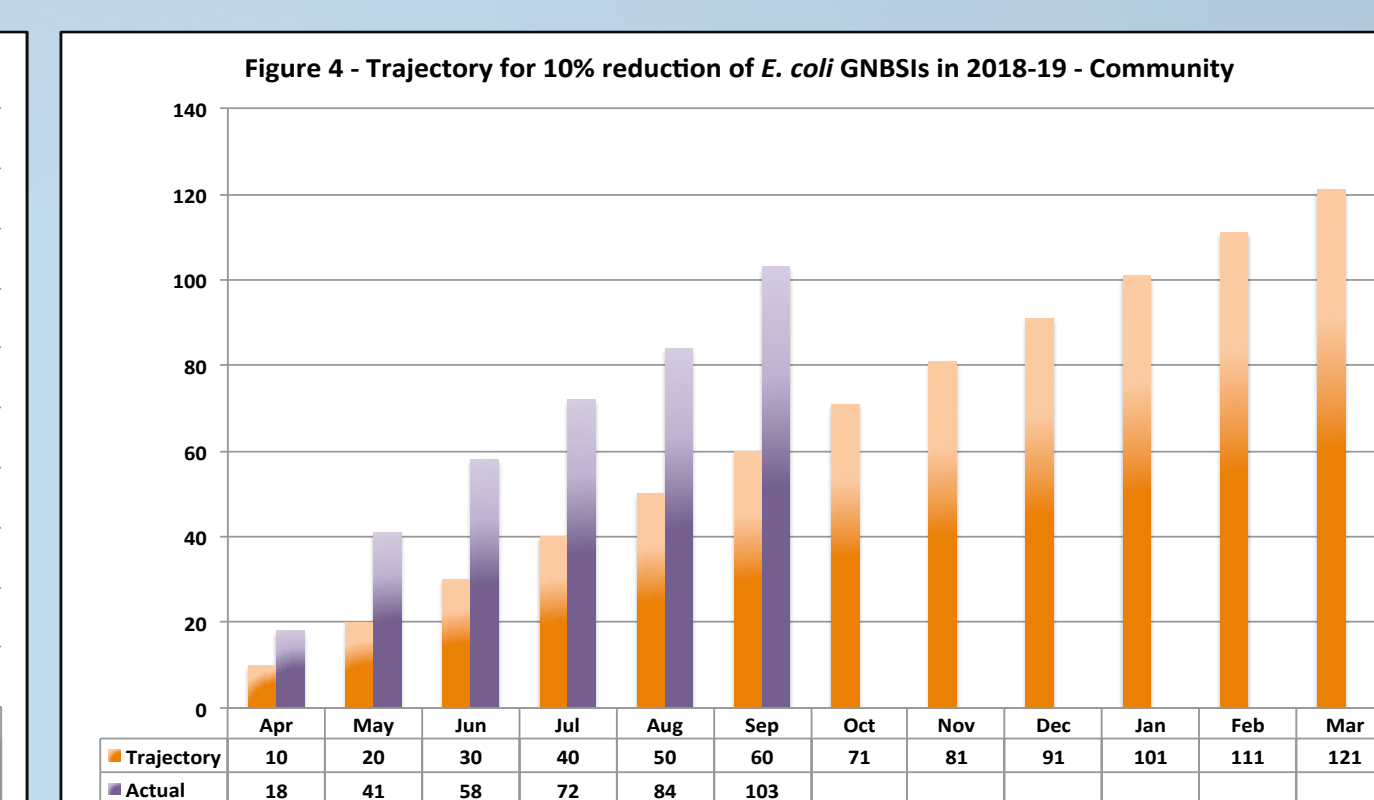
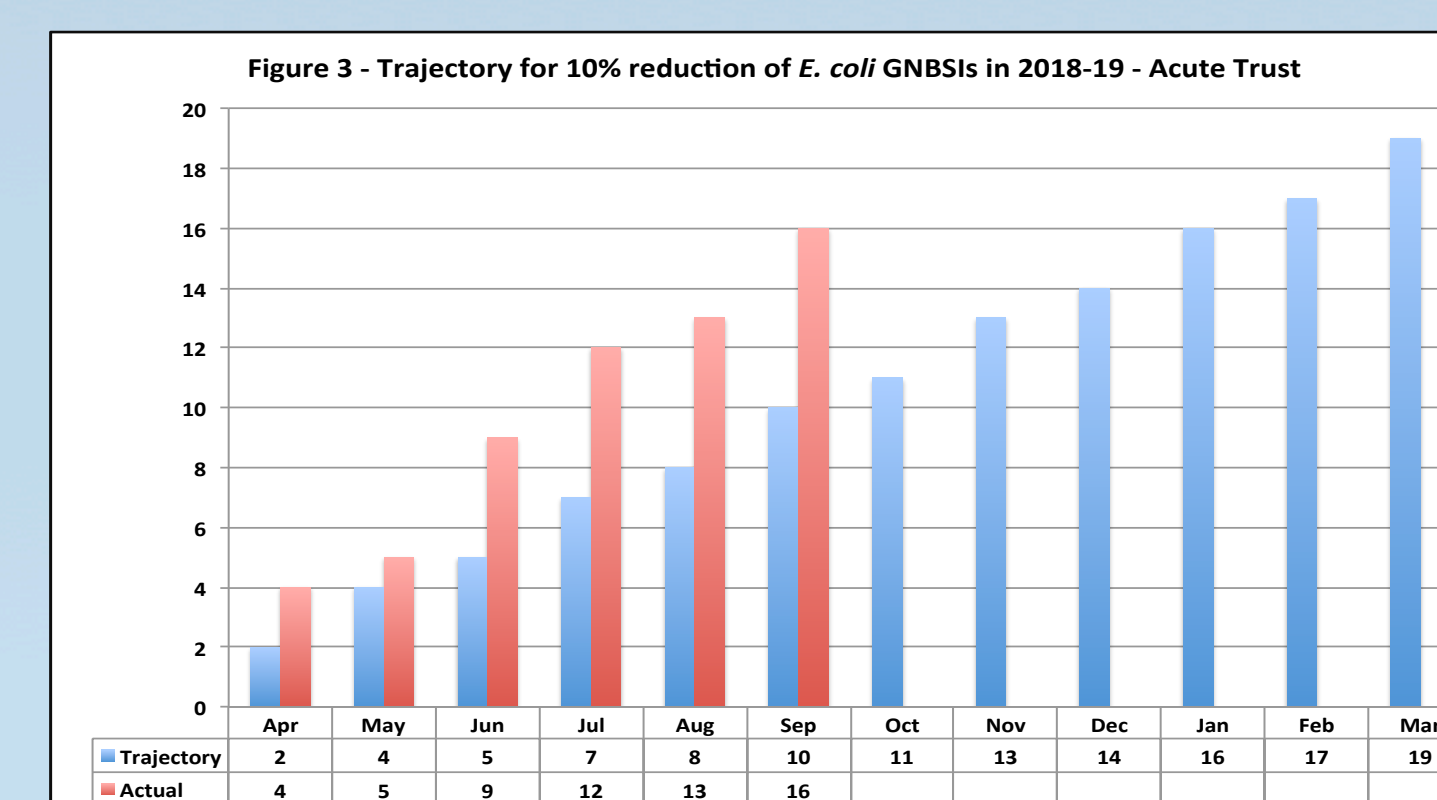
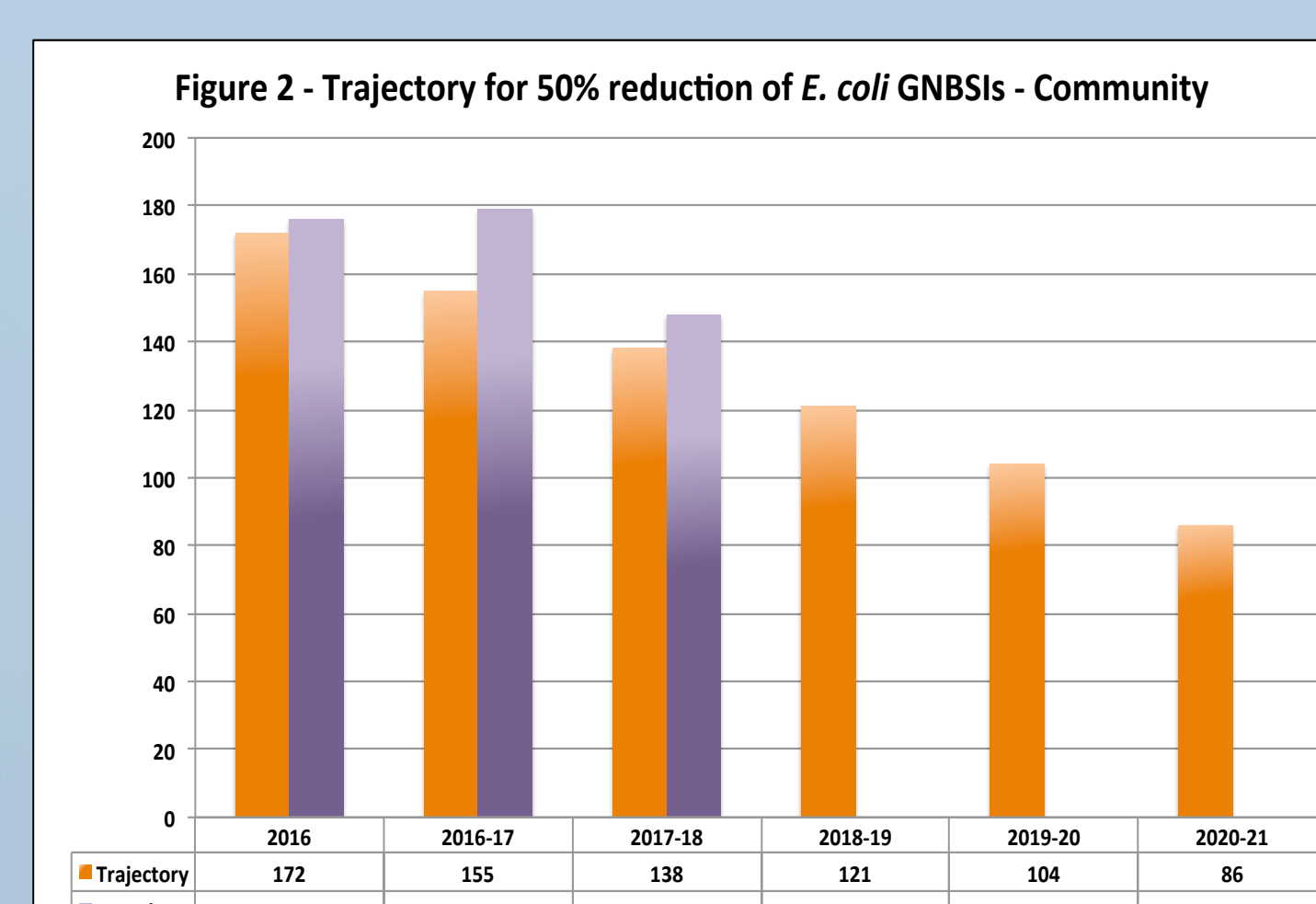
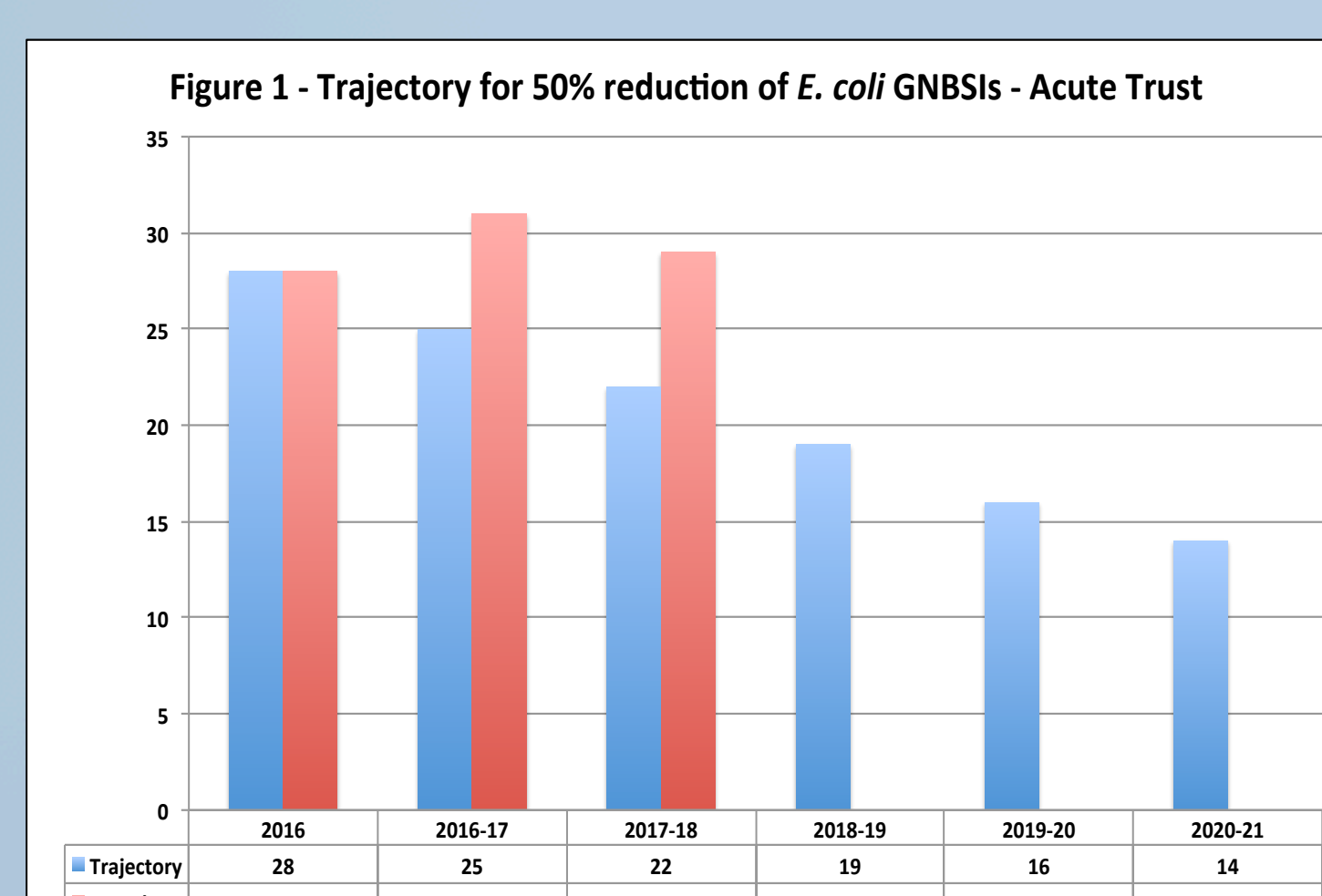
Work already in progress covered the whole health economy and included a catheter passport, catheter pack, and a business case for a Continence Nurse through the Continence Steering Group, and plans for training in recognition of deteriorating patients and for training in catheter care in care homes.

### Advice from the Clinical Commissioning Groups' Steering Group:

To conduct root cause analysis for cases of hepatobiliary sepsis, where there are often repeated episodes of bacteraemia.

### Trajectories to measure progress:

The trajectories for a 50% reduction of *E. coli* BSIs over the 5-year project and a 10% reduction in 2018-19 for the Acute Trust and Community are shown in Figures 1 to 4.



## DISCUSSION

The reduction of GNBSIs is challenging, since they are mainly acquired in the community and often involve the patient's endogenous flora. Initial sources of guidance for our approach included meetings held by NHS Improvement, and associated publications, and papers published in the April 2017 edition of the Journal of Hospital Infection. Strategies to achieve a reduction in GNBSIs require initiatives tailored in part to local findings.

Our baseline audit of *E. coli* bloodstream infections, which are the largest cause of GNBSIs, showed that 86.7% of GNBSIs were community attributed, a higher percentage than that found nationally (68.3%); of note, the national study data was collected in 2012-13 and *E. coli* bacteraemia rates have risen 22% between 2012-13 and 2016-17<sup>1,3</sup>. Urinary tract infections were the largest cause of GNBSIs (42.2%), broadly in line with national findings (51.2% of cases)<sup>1</sup>. As with the national findings, other risk factors in our audit included exposure to healthcare, in particular antimicrobial therapy, and urinary catheter use. We also found high numbers of ESBL-producing bacteria; we were unable to compare this directly with the national data, where non-susceptibility to individual antibiotics was presented<sup>1</sup>. However, treatment failure may occur wherever an individual antibiotic is used for an organism that is non-susceptible on *in vitro* testing, and multiple resistance through ESBL-production increases the likelihood of this event. This in turn can lead to persistent local infection followed by BSI.

It is generally agreed that good urinary catheter care (insertion only if required, good ongoing care and prompt removal) will limit UTI and BSI. Of our resulting priority list for action, a number of activities were underway for prevention of recurrent UTIs, including urinary catheter care, through the Continence Steering Group. The need to reduce GNBSIs provided a spur to complete the business case for the Continence Nurse. Initial plans were to have a single catheter pack in use across the Acute and Community Trusts, but due to different cost-benefit requirements separate catheter packs will be pursued. The catheter passport and information for patients are close to implementation.

Other possible activities resulting from the audit were discussed at our Working Group meeting and some were rejected – comfort rounds to ensure adequate hydration in hospital and care homes were already in place, and use of prophylactic antibiotics was thought to be likely to drive bacterial resistance. Our research proposal to test urine samples earlier in the UTI pathway for high-risk patients in general practice, to guide appropriate antibiotic use earlier, has not to date been successful. Prospective root cause analysis for cases of "unknown" source (outcomes are better for cases where the cause is known) and hepatobiliary sepsis (in order to identify factors amenable to intervention), has not yet been possible, due to changes in staff and reorganisation secondary to reductions in funding.

Education of staff and surveillance of infections continue in tandem with antimicrobial stewardship. Antibiotic resistance profiles are used to update guidelines for empirical treatment in both the Acute Trust and community. The Clinical Commissioning Groups' Steering Group enabled us to share best practice, through contribution of ideas and activities.

Tackling the reduction of GNBSIs requires a community emphasis. In practice, much of our work has taken place in 2018, and we have not been able to demonstrate a reduction in GNBSIs. We know that we are still some way from having the welcome problem of assessing how much each of the individual interventions has contributed to progress.

We are also aware that there are a number of other government targets which impact on the reduction of GNBSIs. Some of these, such as the need to reduce the use of certain groups of antibiotics, and the general financial imperative to reduce costs, may have a detrimental effect on our management of GNBSIs, while others – reduction of sepsis and recognition of the deteriorating patient – will act as enablers for the reduction of GNBSIs.

## CONCLUSIONS

Reduction in HA-GNBSIs is an important aim; we are committed to continuous improvement in patient care to achieve it. We know we must embed currently planned improvements and that further initiatives will be required to achieve the HA-GNBSI target. The next major step will be to include consideration of ways to reduce GNBSIs in children.

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