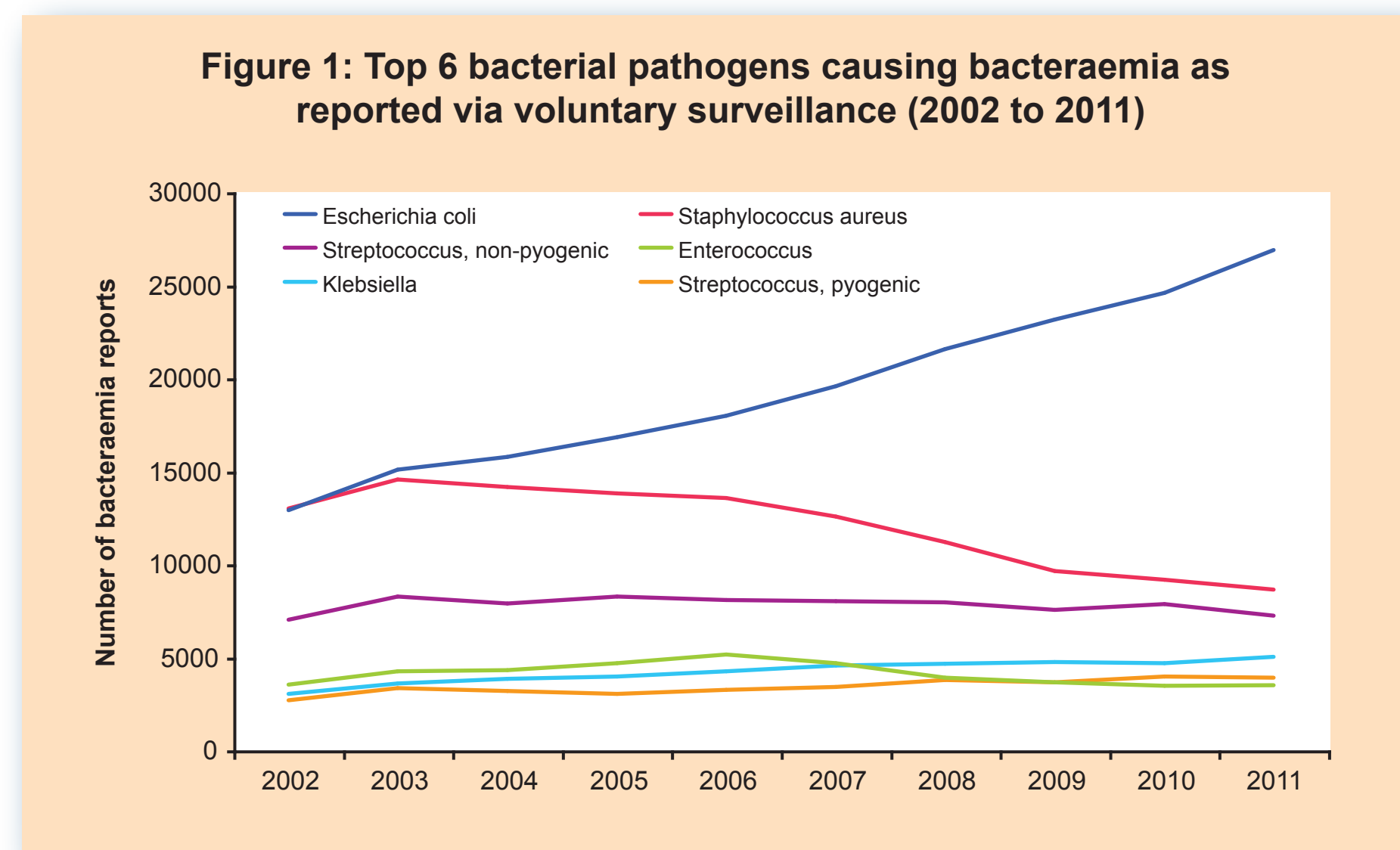


# Surveillance of *Escherichia coli* bacteraemia in England – Preliminary Results of the Recently Introduced Mandatory Surveillance Scheme

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## Introduction and Purpose

- In June 2011 the English Healthcare Acquired Infection (HCAI) mandatory surveillance programme was extended to include the collection of all cases of *Escherichia coli* (*E. coli*) bacteraemia reported by English National Health Service (NHS) acute Trust hospitals.
- Surveillance was initiated in response to observed increases in the number of *E. coli* bacteraemia reports received via voluntary laboratory surveillance over the past decade with the aim of better understanding the national trend. *E. coli* now represents the leading cause of reported bacteraemia in England [1] (figure 1).
- E. coli* mandatory surveillance data is collected by the Health Protection Agency (HPA) on behalf of the English Department of Health (DH) and is based upon the same web based system used to collect data on other key HCAIs over the past seven years (HCAI Data Capture System).
- Patient level information (e.g. patient demographics, the infection episode, admission details, patient provenance etc.) is also collected. Organisations are also able to submit additional risk factor information on a voluntary basis. The collection of such a complete/rich dataset enables comprehensive analysis of the current state of play across the English NHS.
- Present work represents early analysis of the first eight months of mandatory surveillance data (June 2011 to January 2012). These initial findings will be used as the driver for future analysis of the *E. coli* mandatory surveillance data.

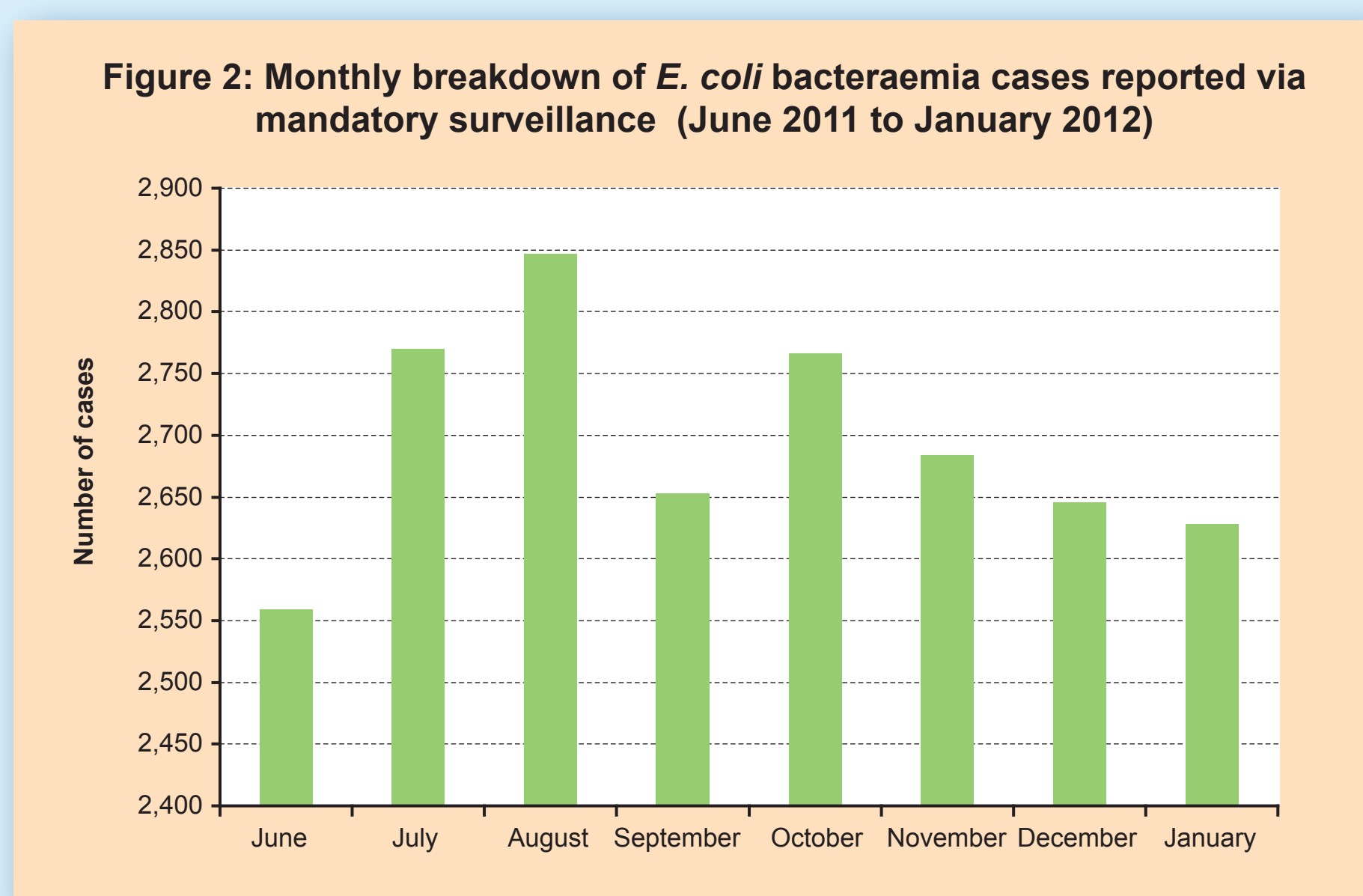


## Methods

- E. coli* bacteraemia data covering the first eight months of surveillance (June 2011 to January 2012) was extracted from the HCAI Data Capture System. This record level information was used to undertake preliminary analysis of the aetiology and underlying risk factors of reported *E. coli* bacteraemia cases.
- All included rates (per 100,000 population) were calculated using Office of National Statistics (ONS) 2010 population estimates for the denominator [2]. Relevant time periods were calculated by dividing the appropriate figures by 365 and then multiplying by the number of days in the period to obtain the relevant denominator value.

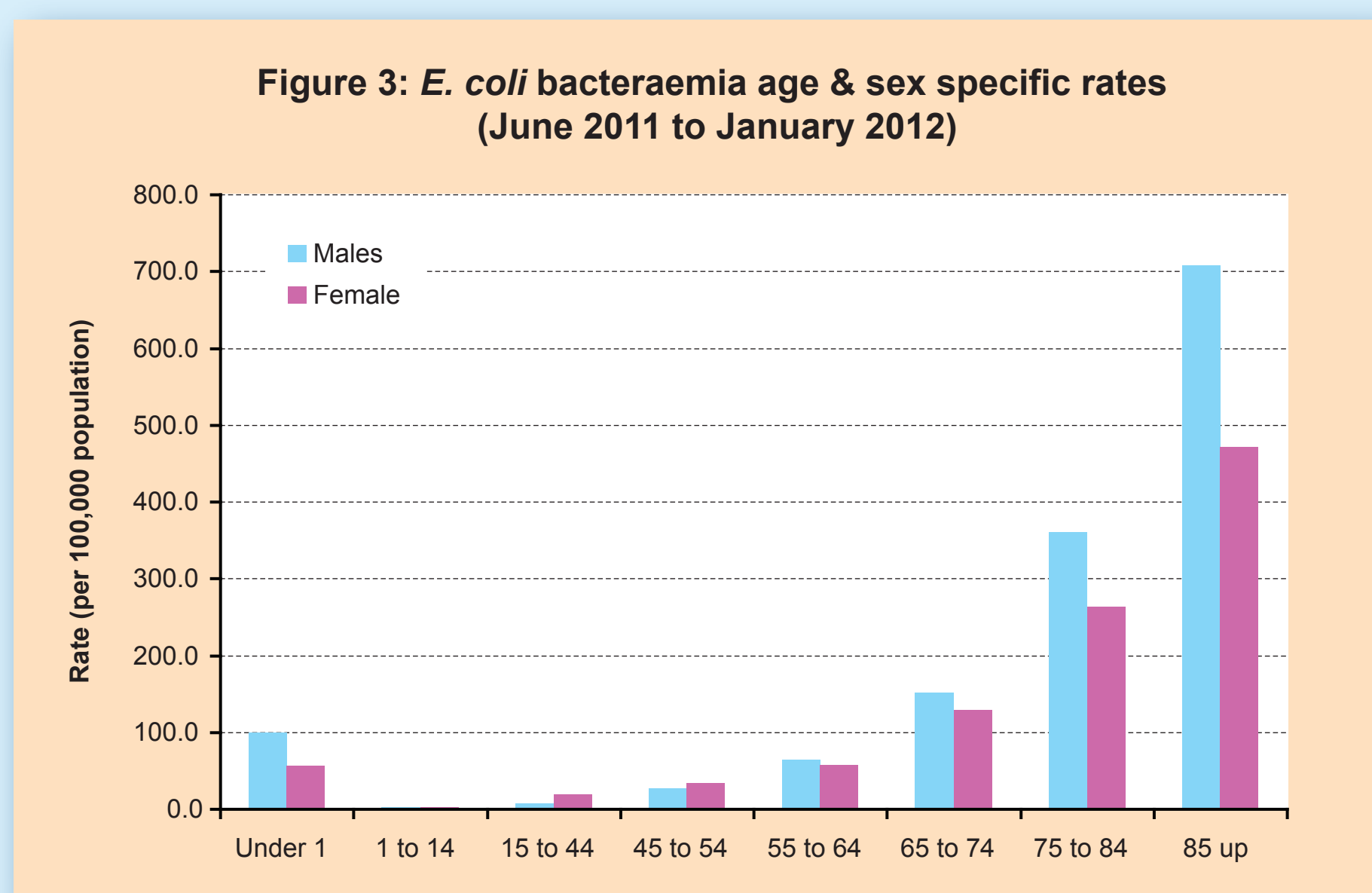
## Results

- A total of 21,553 *E. coli* bacteraemia cases were reported for the period June 2011 to January 2012. The associated rate was 61.47 cases per 100,000 population. This is markedly higher than recently observed MRSA bacteraemia rates (FY 2010/11 data indicates a rate 2.9 cases per 100,000 population) [3].
- Figure 2 details the distribution of *E. coli* bacteraemia cases by month. Although it is too early to determine seasonality from data collected via mandatory surveillance previous analysis of voluntary data suggests the existence of seasonal effect [4]



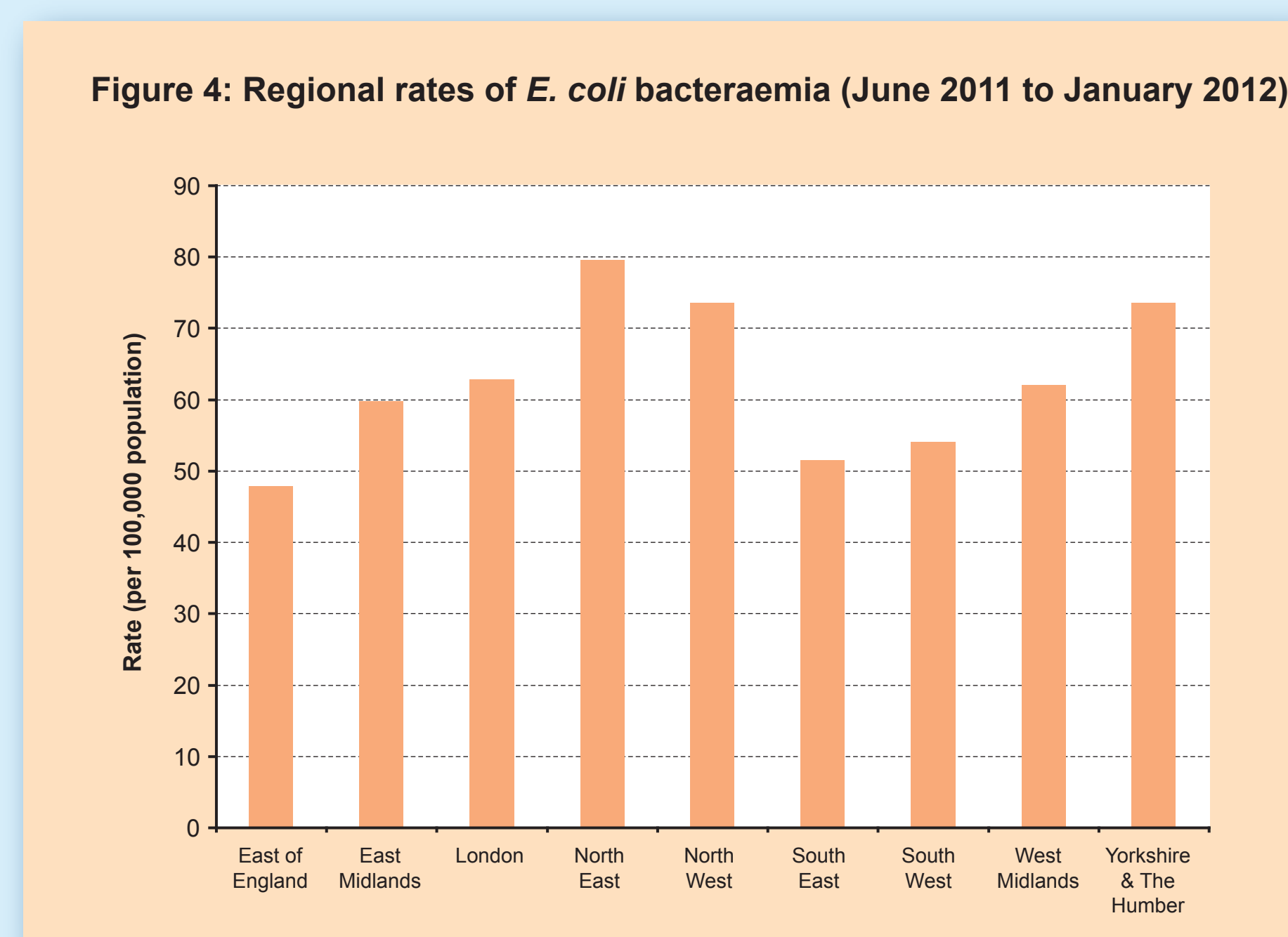
### Age & Sex:

- Details of the patients sex was provided for 20,951 (97%) of the total 21,553 records.
- 9,852 (47%) of the 20,951 reports were among men and 11,099 (53%) were among women.
- Associated rates (per 100,000 population) were 56.98 for men and 62.48 for women.
- Rates generally increase with age for both males and females. The one exception being in patients under one year of age (99.35 and 56.16 per 100,000 population respectively) (figure 3).
- Rates are higher among men across the majority of age groupings. The highest age specific rates per 100,000 population can be observed in men aged '85 years and over' (707.63).
- The lowest rates can be found in females in the '1 to 14' age category (1.98 cases per 100,000 population).
- Rates are in fact only higher among women in the '15 to 44' (19.77 compared to 7.19) and '44 to 55' (33.96 compared to 27.38) age categories.



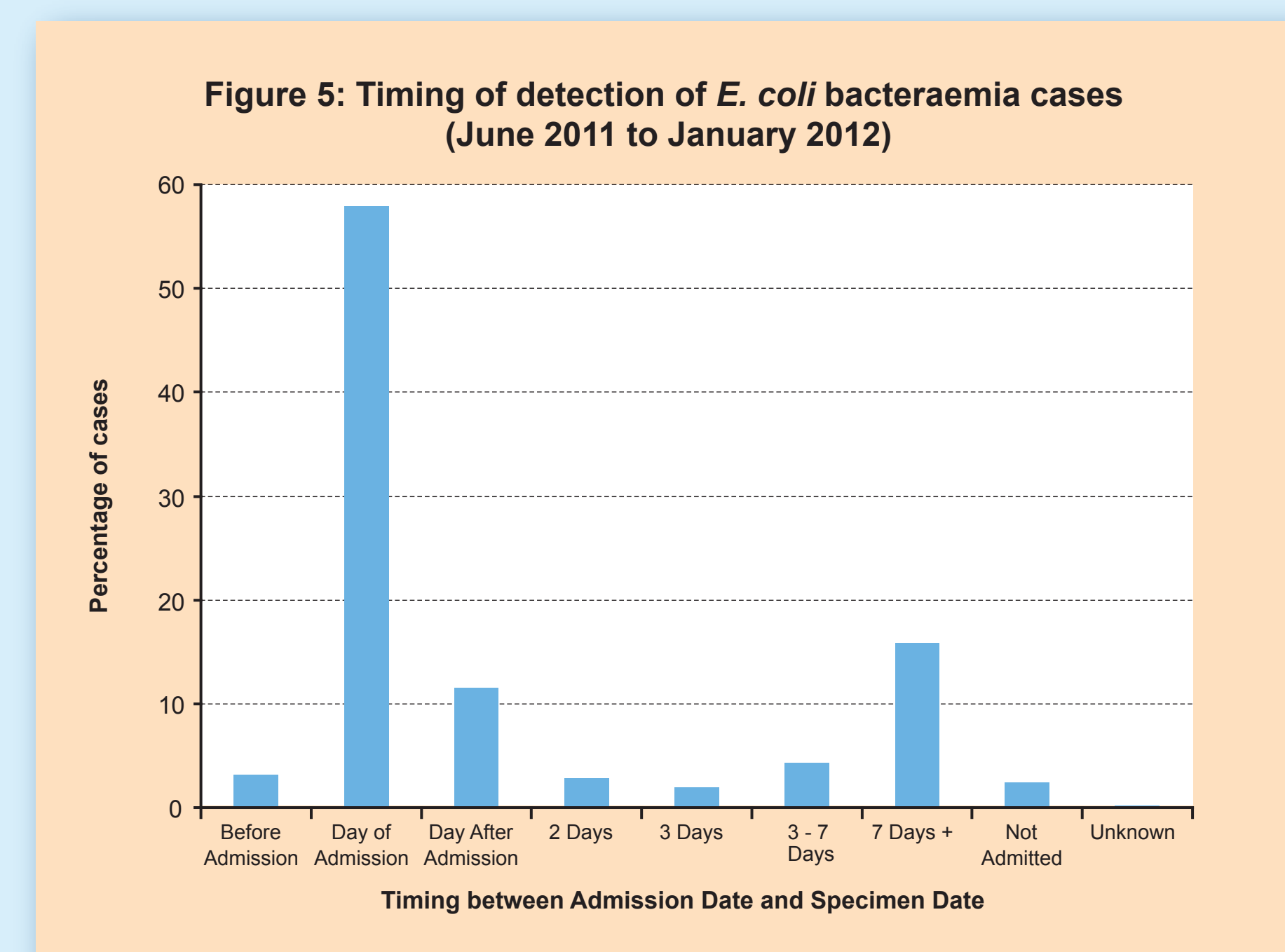
### Regional Breakdown:

- Rates (per 100,000 population) differ markedly by region. The rate in the region with highest rates is approximately 60% larger than that observed in the region with the lowest rate (figure 4).
- The highest rate for the period June 2011 to January 2012 can be observed in the North East (79.61 cases per 100,000 population).
- The lowest rate can be observed in the East of England (47.95 cases per 100,000 population).

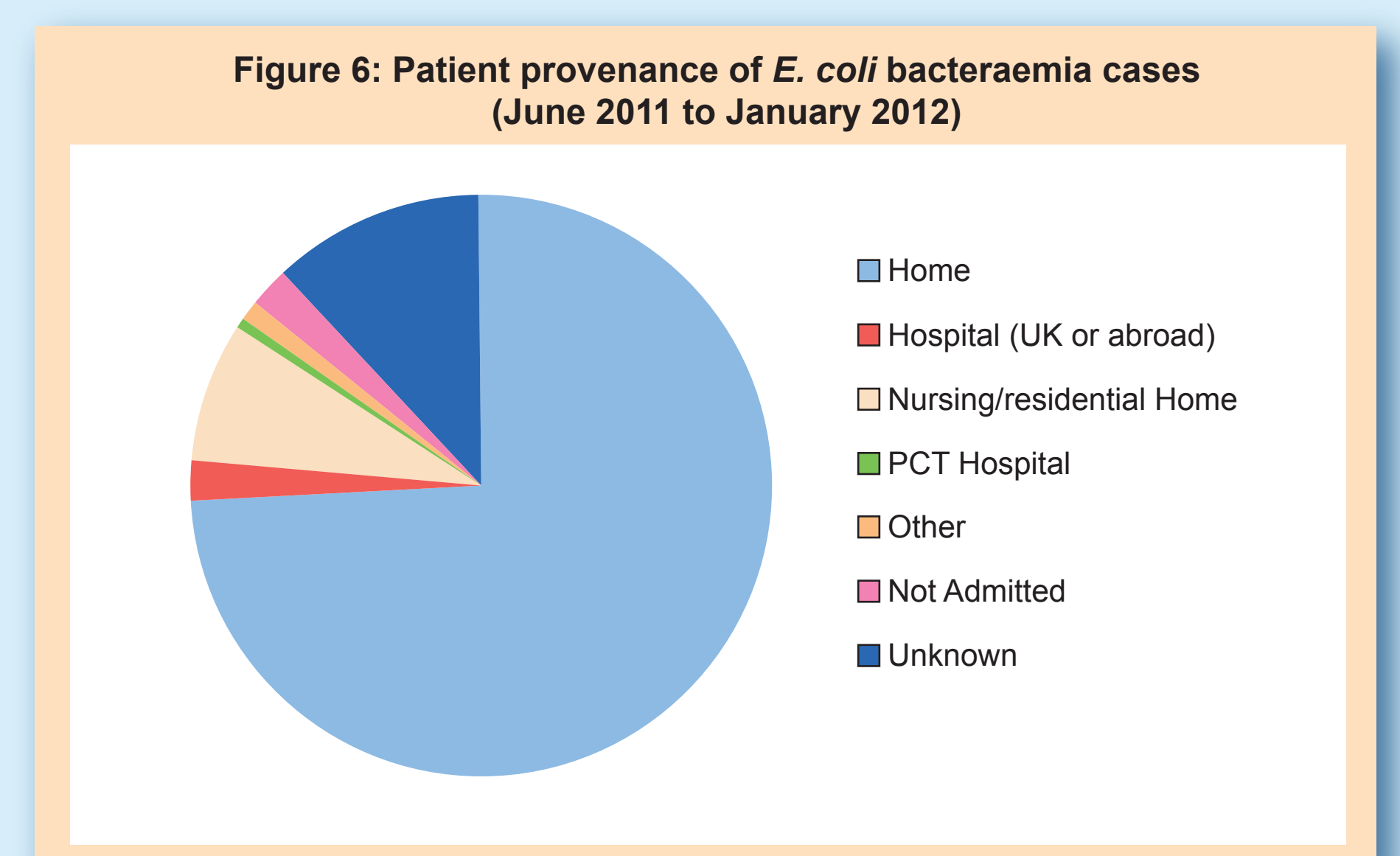


### Timing of Detection:

- 12,482 (59%) of the total 21,553 *E. coli* bacteraemia cases had specimens taken on the day of admission to an acute Trust (figure 5).
- A further 2,493 (12%) of cases had the specimen taken on the day following admission.
- The bulk of cases (78%) have specimens taken within one week of admission to an acute Trust. Only 15% of total cases have their specimen taken after more than seven days.



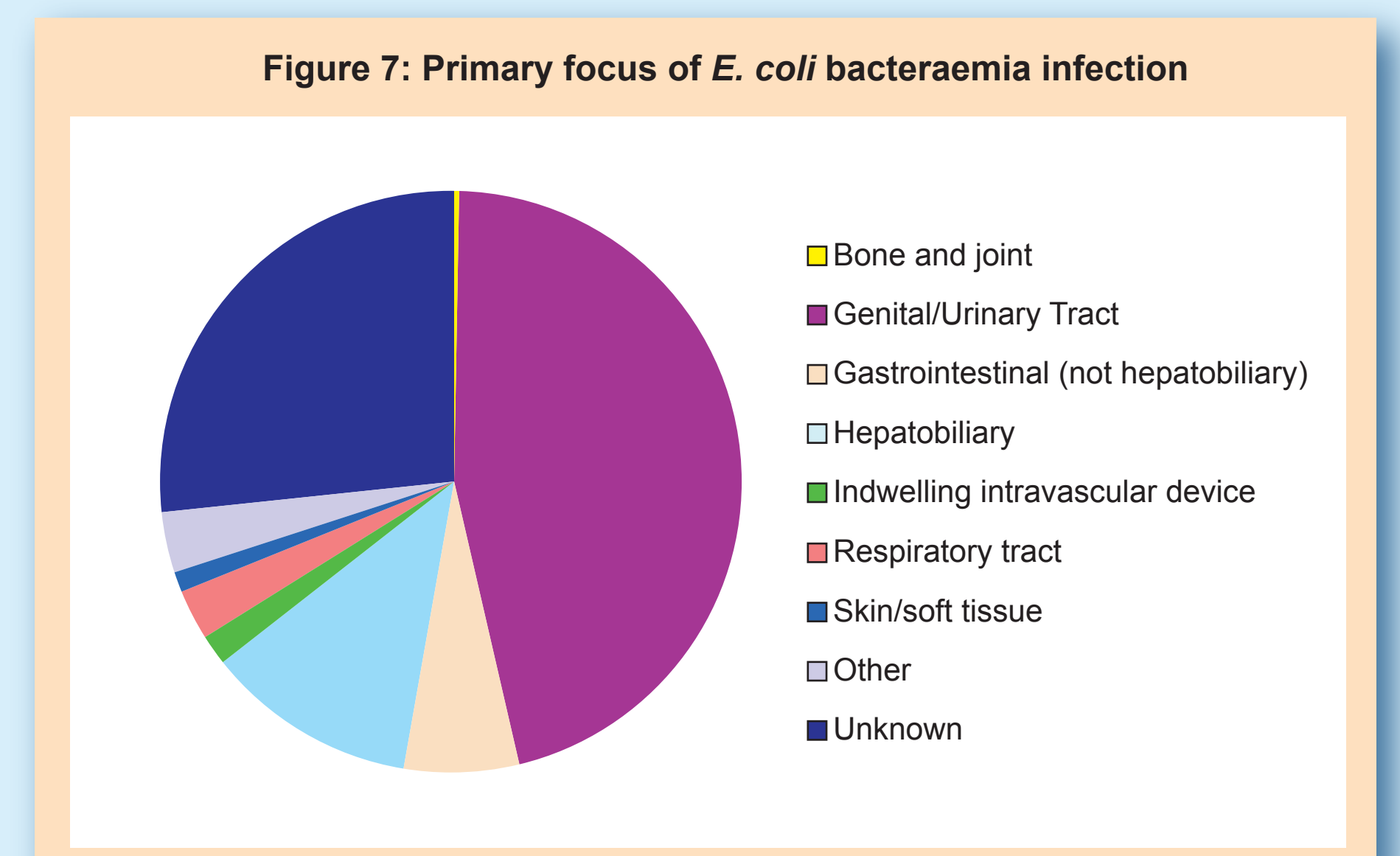
### Patient Provenance:



- 15,965 (74%) of the total *E. coli* bacteraemia cases were admitted from home (figure 6).
- Data indicates a further 1,698 (8%) cases were admitted from nursing homes.
- Unfortunately information on provenance was unknown/not provided in 2,659 (12%) of cases.

### Primary Focus of Infection

- Genital/Urinary tract infections were indicated to be the primary focus of infection in 46% of total reported *E. coli* bacteraemia cases (9,961 out of 21,553 cases) (figure 7). 9,802 (45%) of these cases are Urinary tract infections (UTI).



- For cases where a primary focus of UTI is indicated and information on catheterisation is provided (2,569 of 9,802 records), 81% of records indicate the presence of a catheter.

### Factors Predisposing to *E. coli* bacteraemia:

- 7,275 (34%) of the 21,553 records reported indicate that there were one or more predisposing factors to the *E. coli* bacteraemia episode.
- Of these 7,275 records:
  - 1,898 (26%) indicate the vascular access.
  - 1,350 (19%) indicate that a surgical procedure has been undertaken.
  - 872 (12%) indicate the presence of an invasive device.
  - 855 (12%) indicate the presence of neutropaenia.
  - 644 (9%) indicate the presence of a wound ulcer.

## Conclusions and Future Work

- The number of *E. coli* bacteraemia cases reported via mandatory surveillance is greater than that for any other organism.
- E. coli* bacteraemia rates generally increase with age and were higher among men than women. This is despite a higher number of cases among women.
  - Rates were however higher in women aged between '15 to 44' and '45 to 54' years of age. This is possibly due to a larger number of UTIs among females in these age groupings.
- There were large differences in the rates of *E. coli* bacteraemia by region with the highest being observed in the North East and the lowest in the East of England. Further research into the reasons behind such regional differences will be undertaken in the future.
- UTI infections were indicated to be the primary focus of infection in almost half of reported *E. coli* bacteraemia cases.
  - The presence of a catheter was indicated in 81% of cases where details of catheterisation was provided. This information was however only provided for a minority of records (approximately a quarter of UTI cases).
- Approximately 70% of *E. coli* bacteraemia cases had specimens taken within two days of admission.
  - Timing of detection has routinely been used to designate cases as healthcare associated for certain organisms (greater than two days for MRSA and MSSA bacteraemia).
  - Although the *E. coli* bacteraemia cases manifest in what is traditionally thought to be a community setting, the UTIs causing the majority of these bacteraemias may well relate to previously discharged cases that are subsequently readmitted with an *E. coli* bacteraemia. Further research into this issue is planned for the near future.
- 8% of cases were from nursing homes/long term care facilities. This was surprisingly low given the predominance of elderly patients.
  - A number of nursing home cases are possibly being reported as admissions from home. The intention is to use existing data sources to map patient records to postcode in order to investigate whether or not this is indeed the case.

## Acknowledgements

Thanks to all NHS laboratories who have contributed data to mandatory surveillance scheme, to colleagues within the HPA Local and Regional Services and to the HPA Medical Illustration Department.

## References

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