

Urinary tract infections in the elderly: care pathways and characteristics

Gharbi Myriam, Lishman Hannah, Drysdale Joseph, Goudie Rosalind, Molokhia Mariam, Thomas Anthony, Johnson Alan, Holmes Alison, Aylin Paul

Imperial college London, NIHR Health Protection Research Unit in Healthcare Associated Infection and Antimicrobial Resistance

Objective

To explore the characteristics and management of UTIs among elderly patients in primary care, particularly with respect to diagnosis, care pathways and antibiotics prescribing

Introduction

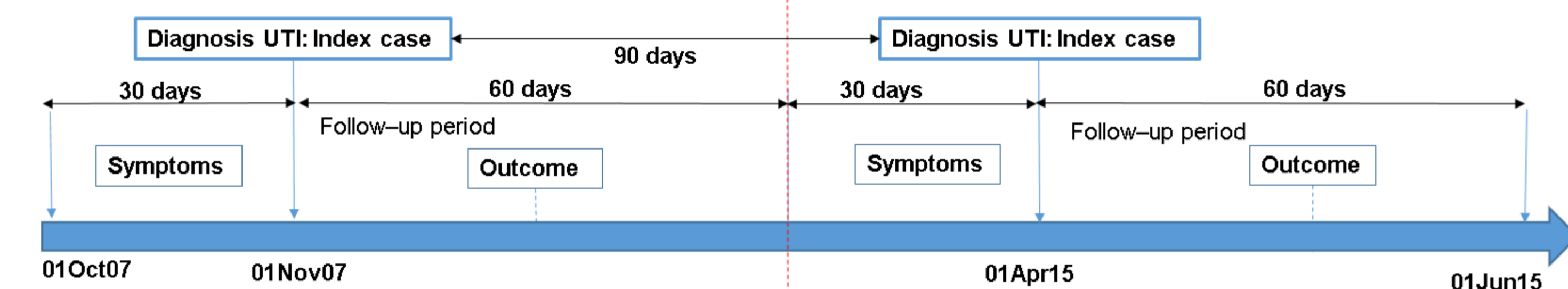
- Urinary tract infections (UTIs): mainly caused by Gram-negative bacteria (*E. coli*, *Proteus* and *Klebsiella*)
- Very common presentation in primary care in England
- Second most frequent type of infection for elderly women
- Difficult to diagnose in elderly patients: non specific symptoms
- Underdiagnosed cases → potential serious consequences
- Over-diagnosed patients → unnecessary antibiotics and risk of increased resistant organisms
- Limited evidence available for older patients with UTI

Methods

- Population: Patients ≥65 years-old diagnosed with lower or suspected UTI in primary care in England
- Period: October 2007 – June 2015
- Linked Databases:
 - The Clinical Practice Research Datalink (CPRD)
 - Hospital Episode Statistics (HES) database
 - Index of Multiple Deprivation (IMD data 10)
 - Office for National Statistics (ONS)

- Extraction: Data relating to symptoms, comorbidities, general practitioner consultations, complication, treatment, hospital admissions and death

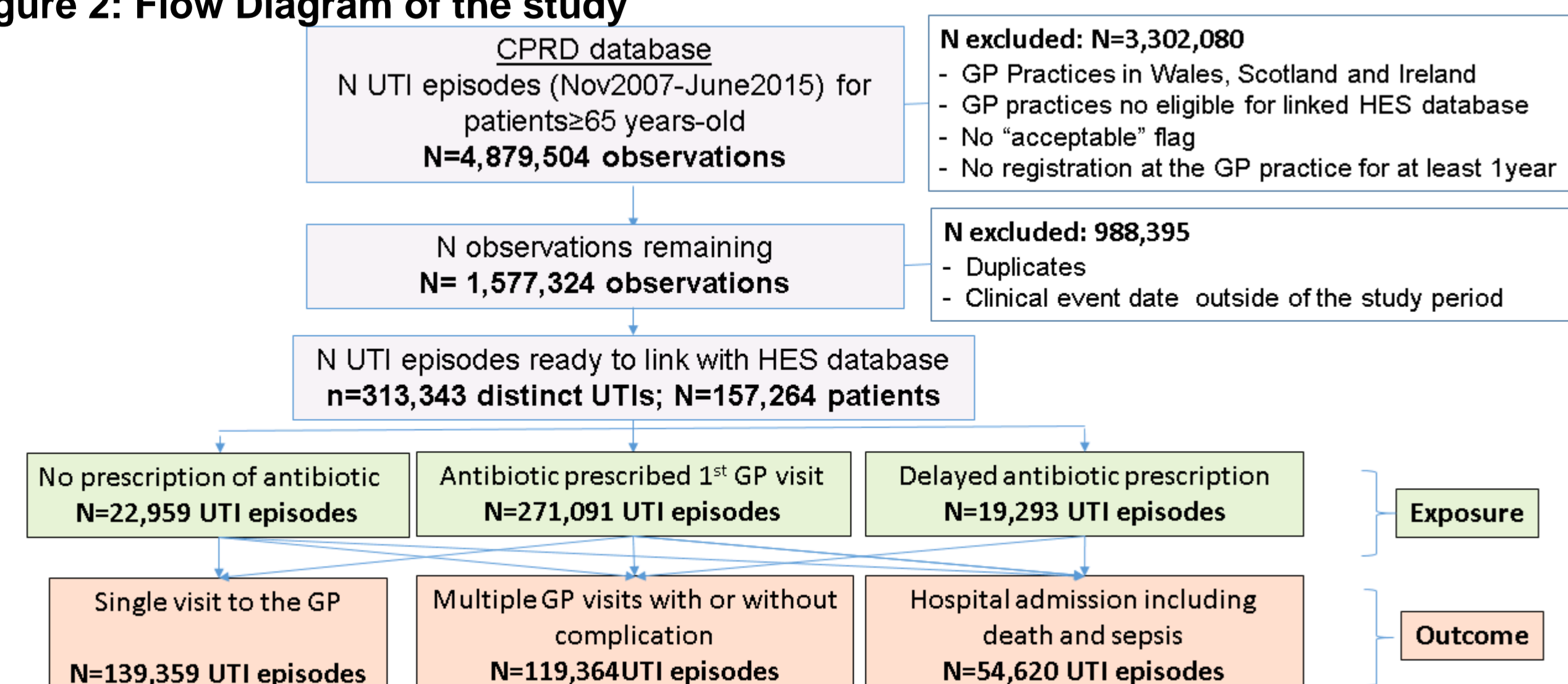
Figure 1: Timeline of the study for each independent episode of UTI



- 3 groups compared according to the complexity of their care pathway:
 - Single consultation to the GP
 - Multiple consultations to the GP for UTI or complication
 - Hospital admission including sepsis and death
- Statistical analysis:
 - Descriptive analysis to explore the characteristics and symptoms of elderly patients presenting with a UTI, their primary care pathways, prescribing patterns and outcomes
 - Multivariate regression and survival analyses to quantify the strength of associations between risk factors and type of care pathways

Results

Figure 2: Flow Diagram of the study



- A total of 157,264 distinct patients and 313,343 unique UTI episodes
- 2 episodes of UTI on average per patient
- 4/5 of the patients were women
- 65-74 yrs-old: 43%, 75-84 yrs-old: 34%, 85-99 yrs-old: 22% and >100 yrs-old: 0.4%
- 13% of the patients with a UTI did not receive any antibiotic
- Among those who did, 74% were given the first line treatment (55% trimethoprim and 19% nitrofurantoin)

Signs/symptoms	Number of distinct UTI episodes
Urine Smell	362 (0.11%)
Enuresis	339 (0.11%)
Urgency	6,692 (2.1%)
Malaise	13,634 (4.3%)
Confusion	18,940 (6.0%)
Fatigue	21,790 (8.9%)
Haematuria	21,310 (6.8%)
Incontinence	31,953 (10.2%)
Dysuria	37,743 (12.0%)
Micturition frequency	43,755 (14.0%)
Pain*	154,377 (49.26%)
Total for 1 or more symptoms**	217,527 (69.42%)

Table 1: Symptoms reported by the GP within 30 days prior to the UTI diagnosis or on the days of the diagnosis

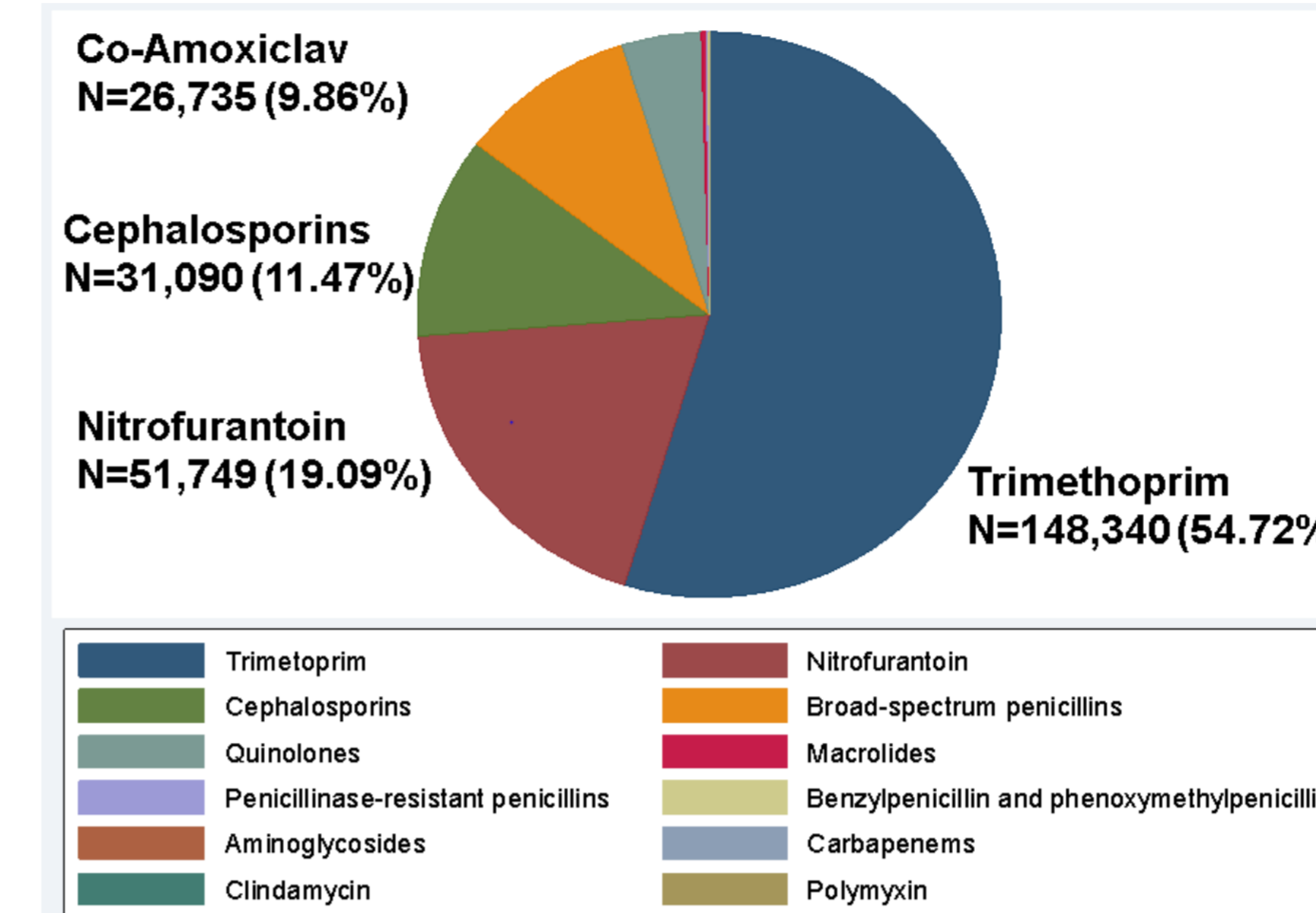


Figure 1: Pie Chart on the antibiotic usage in elderly patients diagnosed with UTI

		Single GP visit	Multiple GP visits	Hospitalisation including death within 60 days	Pvalue	Sepsis	Pvalue	Death 60 days	Pvalue	Death 90 days	Pvalue
Antibiotic exposure	No antibiotic (N=42,252 (13%))	14,722 (35%)	15,065 (36%)	12,465 (30%)		1,215 (3%)		2,188 (5%)		2,866 (7%)	
	Antibiotic within 48h (N=271,091 (87%))	124,637 (46%)	104,299 (38%)	42,155 (16%)	<0.001	479 (0.2%)	<0.001	4,452 (2%)	<0.001	6,351 (2%)	<0.001
Gender	Male (N=66,456 (21%))	24,561 (37%)	23,640 (36%)	18,255 (27%)		853 (1%)		2,586 (4%)		3,518 (5%)	
	Female (N=246,887 (79%))	114,798 (47%)	95,724 (39%)	36,365 (15%)	<0.001	841 (0.3%)	<0.001	4,054 (2%)	<0.001	5,699 (2%)	<0.001
Age	65-74 (N=136,221 (43%))	66,972 (49%)	51,336 (38%)	17,913 (13.15%)		364 (0.3%)		802 (0.6%)		1,167 (0.9%)	
	75-84 (N=107,613 (34%))	45,909 (43%)	41,427 (39%)	20,277 (19%)		689 (0.6%)		2,025 (2%)		2,850 (3%)	
	≥85 (N=69,509 (22%))	26,478 (38%)	26,601 (38%)	16,430 (24%)	<0.001	641 (0.9%)	<0.001	3,813 (5%)	<0.001	5,200 (7%)	<0.001
Total	N=313,343	139,359 (44%)	119,364 (38%)	54,620 (17%)		1694 (0.5%)		6,640 (2%)		9,217 (3%)	

Table 2: Associated factors to complicated UTI, multiple visits to the GP, hospitalisation, sepsis or death

Resultat

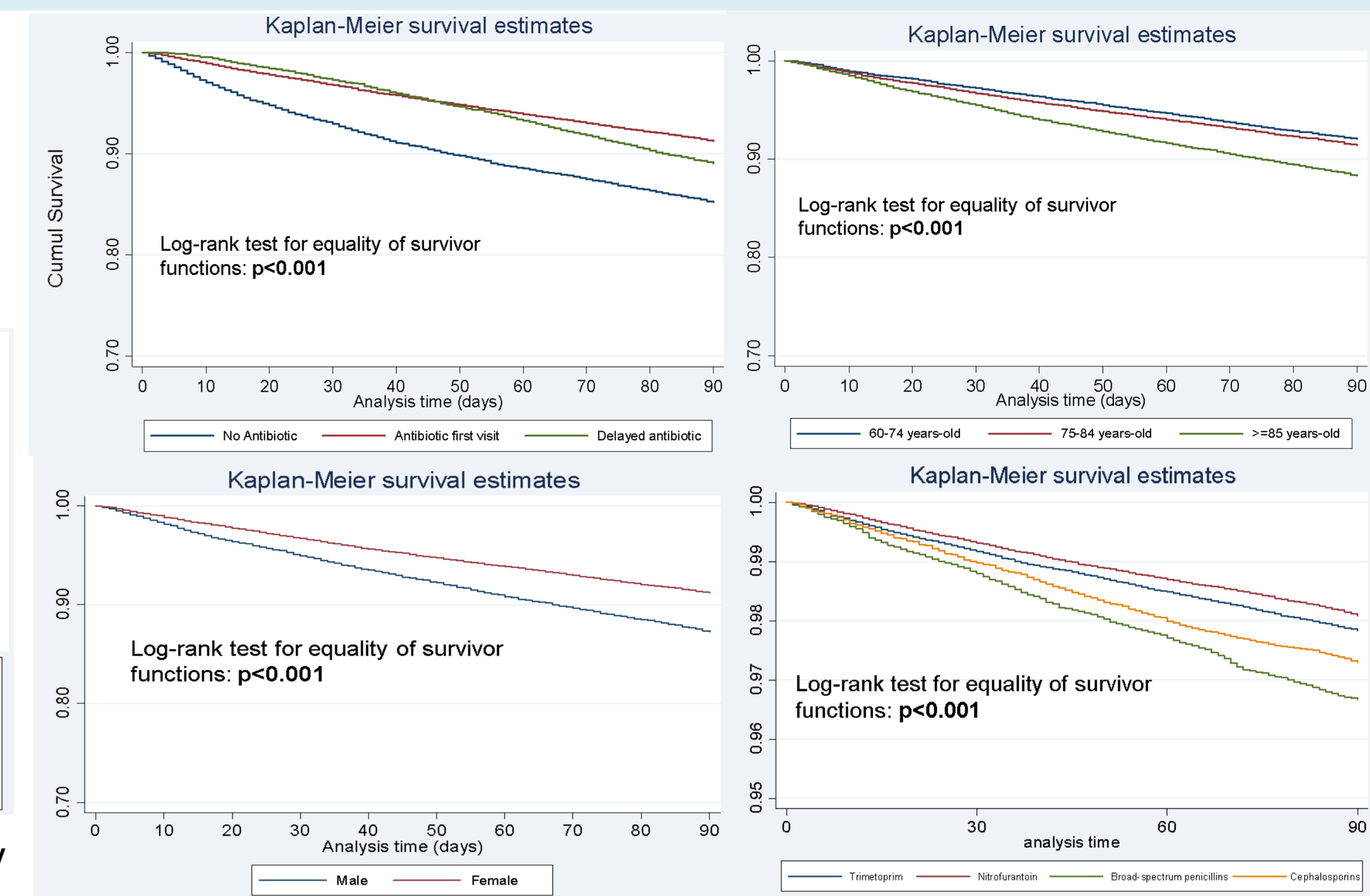


Figure 3: Survival analyses exploring the predictors of death within 90days post infection

		Adjusted Hazard Ratio	95% Conf. Interval	P> z
Antibiotic exposure	Antibiotic first visit	Ref		
	Delayed antibiotic	1.46	1.36-1.57	<0.001
	No antibiotic	2.11	2.00-2.24	<0.001
Age	65-74 years-old	Ref		
	75-84 years-old	2.79	2.60-2.99	<0.001
	≥85 years-old	7.87	7.37-8.40	<0.001
Gender	Male	Ref		
	Female	0.51	0.49-0.53	<0.001
Region	North of England & Yorkshire	Ref		
	Midlands & East of England	0.94	0.89-1.00	0.042
	South of England	0.92	0.87-0.97	0.002
	London	0.73	0.67-0.80	<0.001
Index Multiple Deprivation	1 st quintile (least deprived)	Ref		
	2	1.13	1.06-1.20	<0.001
	3	1.19	1.12-1.27	<0.001
	4	1.19	1.12-1.28	<0.001
	5 th quintile (most deprived)	1.26	1.17-1.36	<0.001
Charlson Comorbidity Score	Score [0-12]	1.45	1.42-1.48	<0.001
Diabetes	Yes/No	0.69	0.65-0.74	<0.001
Cancer	Yes/No	2.51	2.27-2.77	<0.001
Immunosuppressed	Yes/No	5.97	3.31-10.79	<0.001
Renal diseases	Yes/No	0.77	0.69-0.86	<0.001
Smoking	Yes/No	1.20	1.07-1.35	0.003

Table 3: Multivariate Cox Regression analysis for 90 days post diagnosis all-cause mortality

Conclusion

- UTI are common in elderly women but men are more likely to develop complication, sepsis or death
- No prescription of antibiotic or delayed prescription is significantly associated to complicated UTIs including hospitalisation, sepsis and death
- Increased age, deprivation, comorbidities, living in the North of England are also risk factors for negative outcomes
- ~3/4 of the antibiotics prescribed for uncomplicated UTI are narrow spectrum recommended as first line treatment
- The survival probability is significantly higher with nitrofurantoin than other drugs

Limitation:

- Routinely collected data (not collected primarily for research purposes): potential issues of data quality, missing data and inconsistent coding for practices over time and between GP practices and GPs.
- Selection of patients based on clinical diagnostic coding information and not on laboratory confirmed UTI
- Absence of microbiology data to investigate the susceptibility of the bacteria to the drugs
- Data on antibiotic prescribed but not taken: no capture of delayed prescriptions mentioned orally during the consultation

References

Gordon LB, Waxman MJ, Ragsdale L, Mermel LA. Overtreatment of Presumed Urinary Tract Infection in Older Women Presenting to the Emergency Department. *J Am Geriatr Soc.* 2013;61(5):788-92; Mody L, Juthani-Mehta M. Urinary tract infections in older women: A clinical review. *JAMA.* 2014;311(8):844-54; Gopal Rao G, Patel M. Urinary tract infection in hospitalized elderly patients in the United Kingdom: the importance of making an accurate diagnosis in the post broad-spectrum antibiotic era. *The Journal of antimicrobial chemotherapy.* 2009;63(1):5; NICE. Urinary tract infection (lower) - women - Clinical Knowledge Summary 2015. Available from: <http://cks.nice.org.uk/urinary-tract-infection-lower-women/#backgroundsub:3>