

Exploring alternative definitions for recurrent urinary tract infection in women

Supplementary material

Figures

Figure S1: Schematic to illustrate the base rUTI definition.

Rows represent different hypothetical scenarios of infection times for an individual, with the initial infection assumed to occur at time 0. The red circle indicates the time at which the rUTI definition would be met under the base definition. In all cases this is equivalent to the first point at which two infections have occurred during the previous six months. The same is not true when defining a time window in which an individual is considered to exit a period of rUTI; however, clearly defining the entry point for a period of rUTI is the focus of our article.

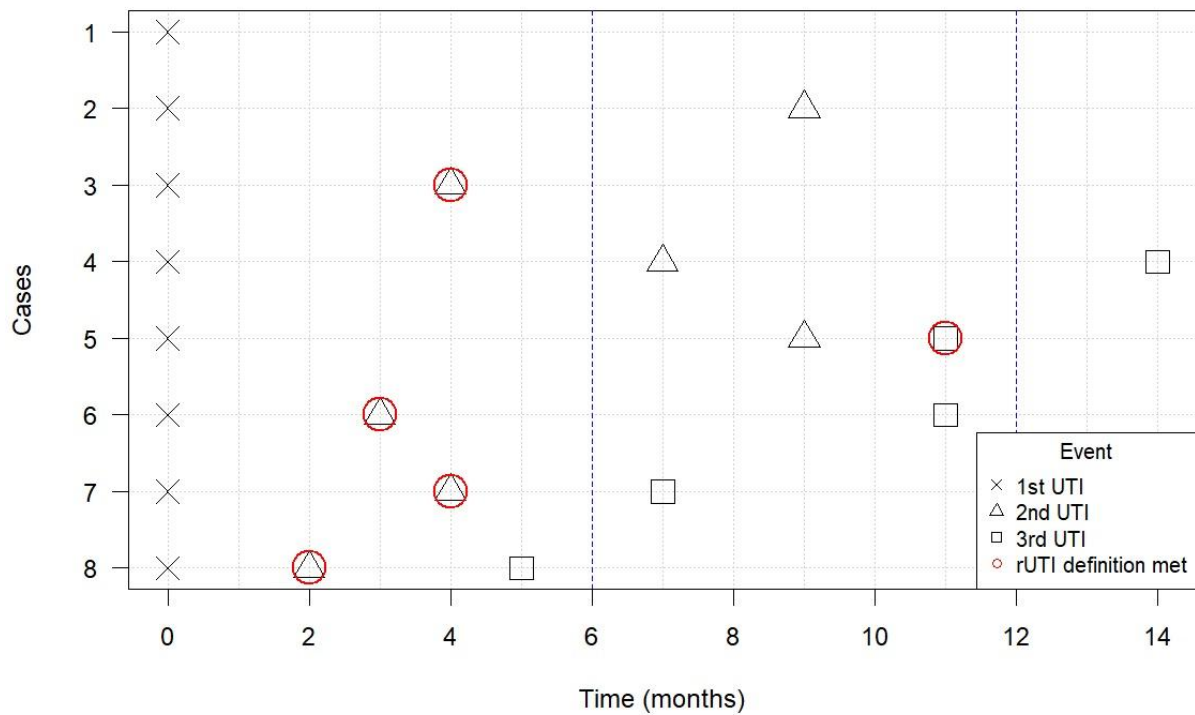


Figure S2: Histograms of the distribution of age at the time the base rUTI definition was met for women who met the base rUTI definition at least once in the IORD (left) and CPRD (right) cohorts

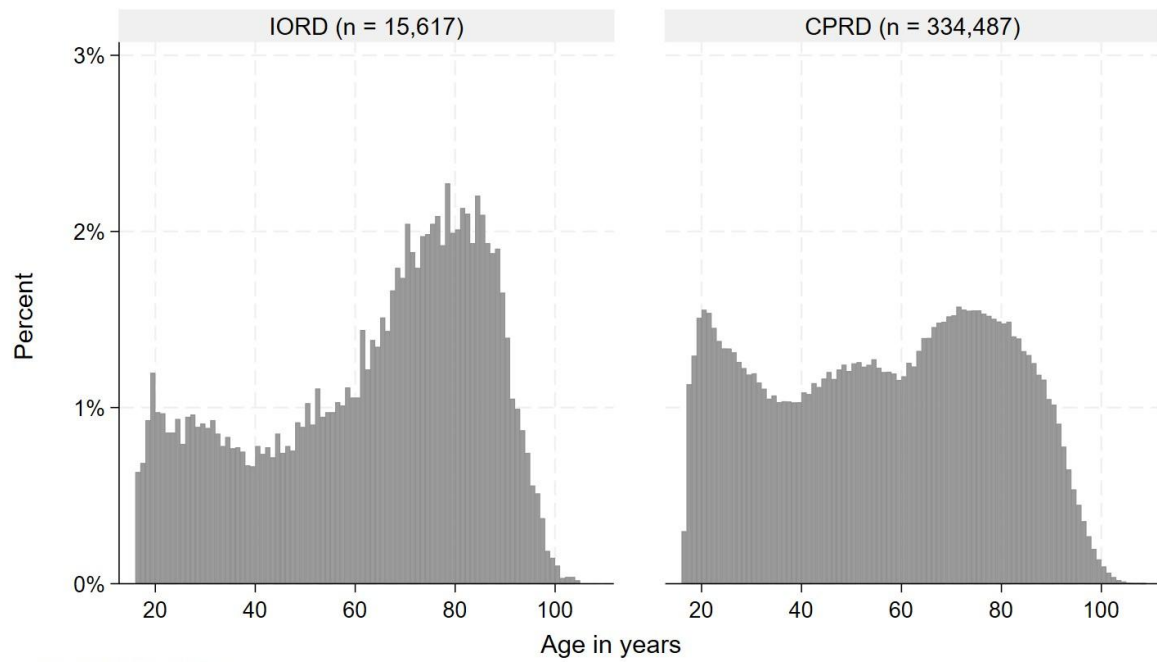
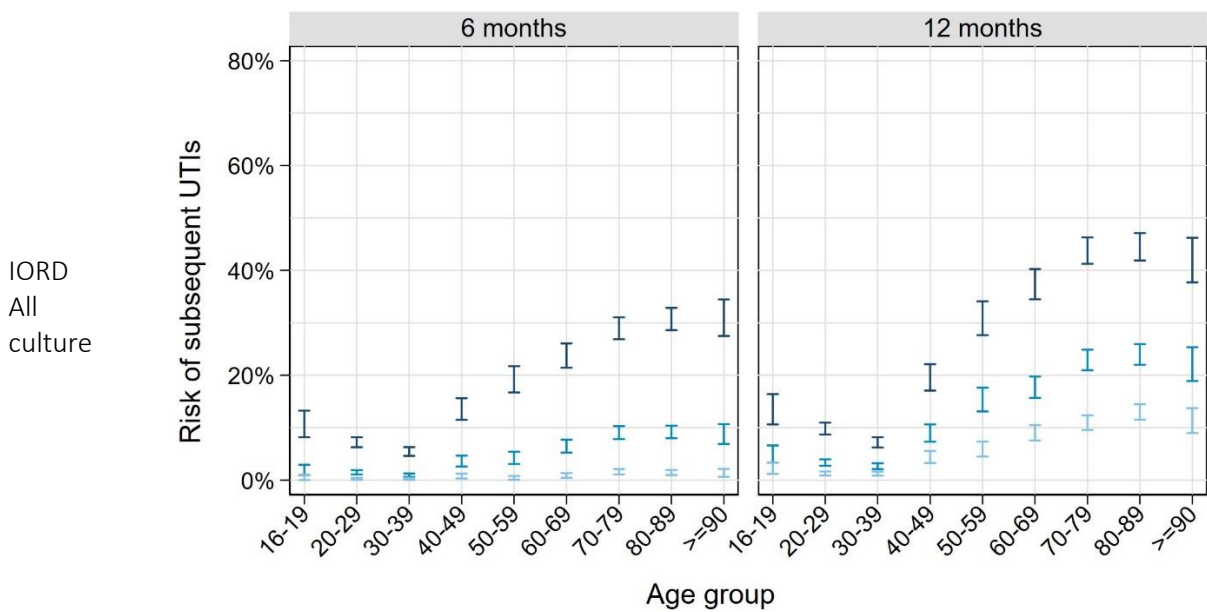
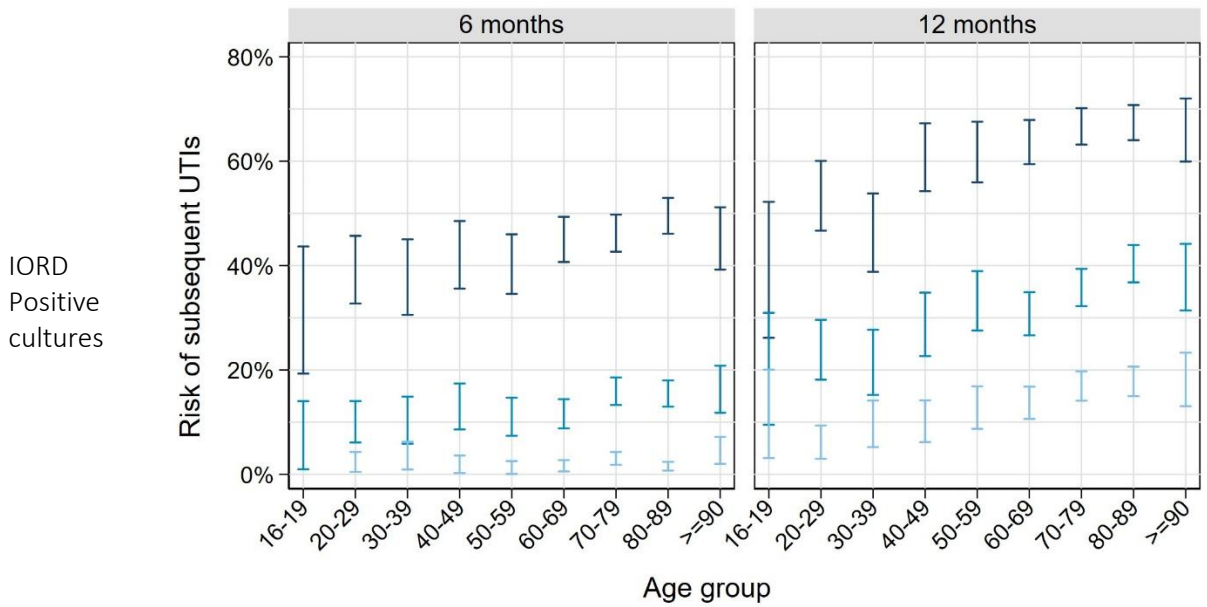
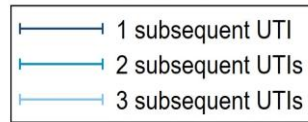
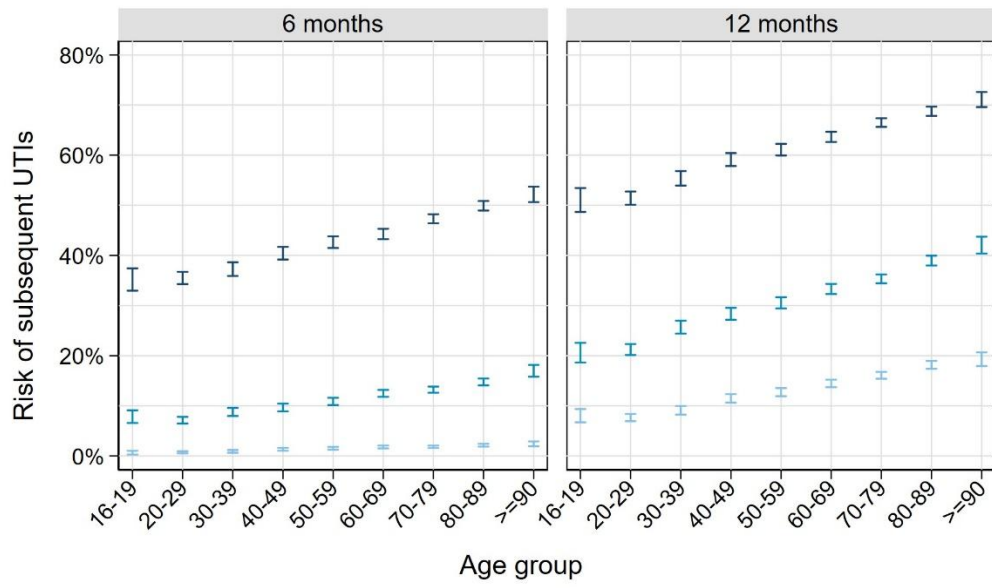


Figure S3: Risk of subsequent UTIs within 6 and 12 months after meeting an index rUTI episode defined as 3UTIs in 6 months, stratified by age

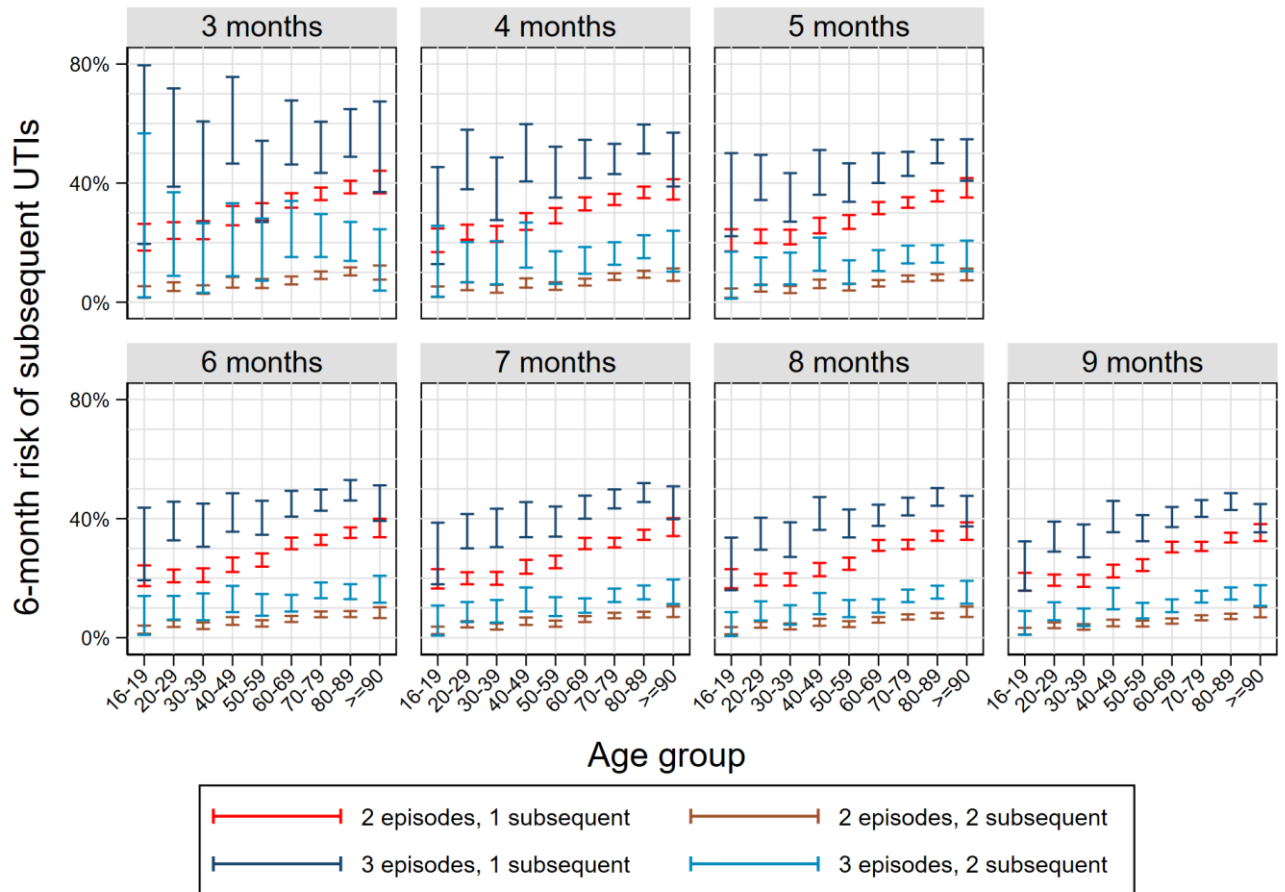


CPRD



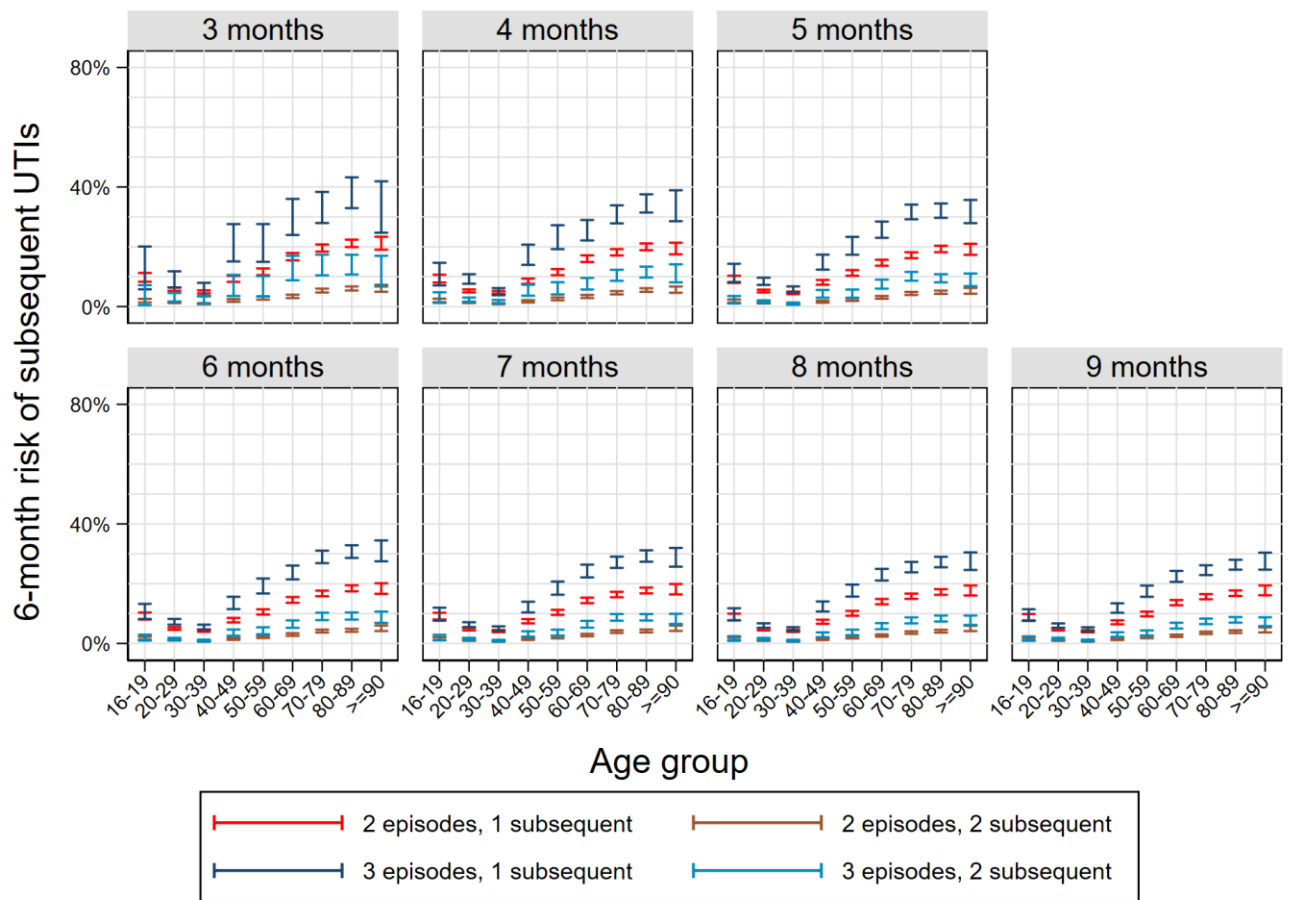
Graphs by Time since rUTI

Figure S4: IORD positive cultures - Risk of subsequent UTIs within six months after meeting an index rUTI episode defined using different combinations of number of UTIs and time window, stratified by age



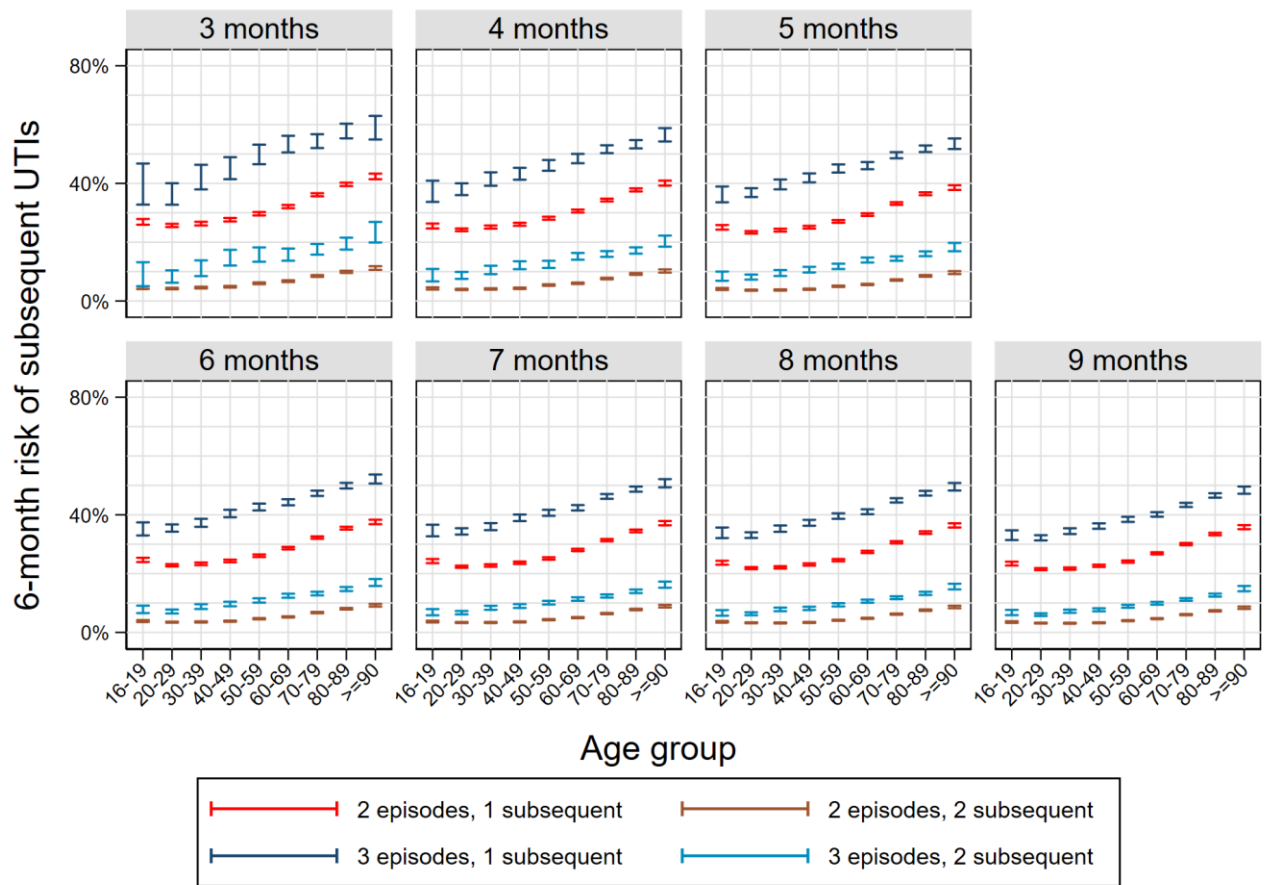
NB: Risk of three subsequent UTIs was close to zero for all definitions.

Figure S5: IORD all cultures - Risk of subsequent UTIs within six months after meeting an index rUTI episode defined using different combinations of number of UTIs and time window, stratified by age



NB: Risk of three subsequent UTIs was close to zero for all definitions.

Figure S6: CPRD – Risk of subsequent UTIs within six months after meeting an index rUTI episode defined using different combinations of number of UTIs and time window, stratified by age



NB: Risk of three subsequent UTIs was close to zero for all definitions.

Tables

Table S1: Number of women with one or more UTIs who met the rUTI criteria at least once, for each rUTI definition, stratified by age.

Age	Timeframe within which UTI episodes must occur to satisfy each rUTI definition						
	3 months n (%)	4 months n (%)	5 months n (%)	6 months n (%)	7 months n (%)	8 months n (%)	9 months n (%)
IORD positive cultures							
2 episodes							
16-19	332 (3)	413 (3)	477 (3)	538 (3)	592 (4)	617 (4)	662 (4)
20-29	906 (9)	1117 (9)	1286 (9)	1420 (9)	1544 (9)	1645 (9)	1712 (9)
30-39	776 (7)	964 (8)	1116 (8)	1235 (8)	1345 (8)	1412 (8)	1478 (8)
40-49	782 (7)	988 (8)	1120 (8)	1241 (8)	1332 (8)	1420 (8)	1511 (8)
50-59	1023 (10)	1241 (10)	1448 (10)	1584 (10)	1707 (10)	1805 (10)	1895 (10)
60-69	1513 (14)	1854 (15)	2086 (15)	2277 (15)	2424 (15)	2558 (15)	2668 (15)
70-79	2116 (20)	2592 (20)	2873 (20)	3122 (20)	3331 (20)	3481 (20)	3620 (20)
80-89	2241 (21)	2633 (21)	2896 (20)	3098 (20)	3267 (20)	3411 (19)	3525 (19)
>=90	768 (7)	920 (7)	1020 (7)	1102 (7)	1176 (7)	1230 (7)	1281 (7)
3 episodes							
16-19	9 (2)	28 (2)	44 (2)	56 (2)	74 (2)	92 (2)	103 (2)
20-29	33 (6)	97 (6)	163 (6)	218 (6)	271 (6)	307 (6)	344 (6)
30-39	32 (5)	83 (5)	132 (5)	174 (5)	217 (5)	254 (5)	282 (5)
40-49	42 (7)	104 (6)	171 (6)	229 (7)	272 (6)	315 (6)	347 (6)
50-59	50 (8)	134 (8)	229 (9)	297 (9)	372 (9)	430 (9)	487 (9)
60-69	87 (15)	243 (15)	393 (15)	522 (15)	648 (15)	753 (15)	834 (15)
70-79	137 (23)	401 (24)	622 (23)	803 (23)	999 (24)	1147 (23)	1272 (23)
80-89	158 (27)	431 (26)	675 (25)	889 (25)	1038 (24)	1190 (24)	1309 (24)
>=90	44 (7)	136 (8)	229 (9)	303 (9)	360 (8)	411 (8)	467 (9)
CPRD							
2 episodes							
16-19	8428 (4)	11026 (4)	12740 (4)	14160 (4)	15419 (4)	16484 (4)	17344 (4)
20-29	26442 (13)	34675 (13)	40576 (13)	45403 (14)	49498 (14)	53128 (14)	56139 (14)
30-39	20635 (10)	27030 (10)	31765 (11)	35863 (11)	39323 (11)	42332 (11)	44906 (11)
40-49	22714 (11)	29553 (11)	34602 (11)	38836 (12)	42542 (12)	45679 (12)	48386 (12)
50-59	24886 (12)	31647 (12)	36615 (12)	40928 (12)	44506 (12)	47608 (12)	50317 (12)
60-69	28888 (14)	36365 (14)	41684 (14)	45880 (14)	49512 (14)	52668 (14)	55388 (14)
70-79	34019 (16)	41785 (16)	47148 (16)	51343 (15)	54913 (15)	57964 (15)	60496 (15)
80-89	29315 (14)	35717 (14)	40065 (13)	43552 (13)	46461 (13)	48781 (13)	50676 (13)
>=90	12308 (6)	15132 (6)	17040 (6)	18522 (6)	19634 (5)	20610 (5)	21386 (5)
3 episodes							
16-19	198 (2)	739 (3)	1301 (3)	1852 (3)	2360 (3)	2806 (3)	3245 (3)
20-29	706 (8)	2377 (9)	4255 (9)	6215 (10)	8019 (10)	9760 (10)	11343 (10)
30-39	567 (7)	1888 (7)	3458 (7)	5043 (8)	6615 (8)	8041 (8)	9355 (9)
40-49	704 (8)	2414 (9)	4181 (9)	6003 (9)	7695 (10)	9354 (10)	10933 (10)
50-59	906 (11)	2969 (11)	5139 (11)	7306 (11)	9231 (11)	11114 (12)	12763 (12)
60-69	1253 (15)	4002 (15)	6764 (15)	9341 (14)	11731 (14)	13987 (15)	15903 (15)
70-79	1835 (22)	5768 (21)	9384 (20)	12575 (19)	15505 (19)	18160 (19)	20451 (19)
80-89	1660 (20)	5303 (19)	8631 (19)	11533 (18)	14054 (17)	16234 (17)	18121 (17)
>=90	684 (8)	2136 (8)	3540 (8)	4780 (7)	5823 (7)	6748 (7)	7531 (7)

Table S2: Frequencies of women with further UTI episodes within 12 months following the time they met the rUTI definition for the first time. Numbers in brackets are Kaplan-Meier estimates of the probability of having at least the stated number of further UTIs within 12 months.

	Timeframe within which UTI episodes must occur to satisfy each rUTI definition						
	3 months	4 months	5 months	6 months	7 months	8 months	9 months
IORD positive cultures							
2 episodes							
n	10457	12722	14322	15617	16718	17579	18352
≥ 1	4588 (0.48)	5382 (0.46)	5902 (0.45)	6302 (0.44)	6597 (0.43)	6801 (0.42)	6996 (0.41)
≥ 2	1862 (0.20)	2156 (0.19)	2272 (0.18)	2379 (0.17)	2471 (0.17)	2515 (0.16)	2562 (0.16)
≥ 3	677 (0.08)	780 (0.07)	815 (0.07)	839 (0.06)	864 (0.06)	870 (0.06)	880 (0.06)
3 episodes							
n	592	1657	2658	3491	4251	4899	5445
≥ 1	378 (0.69)	999 (0.66)	1549 (0.63)	2024 (0.63)	2394 (0.61)	2675 (0.59)	2917 (0.58)
≥ 2	208 (0.40)	528 (0.37)	795 (0.34)	1022 (0.33)	1159 (0.31)	1296 (0.30)	1412 (0.30)
≥ 3	106 (0.21)	243 (0.17)	346 (0.15)	420 (0.14)	483 (0.13)	529 (0.13)	570 (0.12)
CPRD							
2 episodes							
n	207635	262930	302235	334487	361808	385254	405038
≥ 1	91976 (0.48)	111923 (0.46)	125080 (0.45)	135419 (0.44)	143509 (0.43)	149889 (0.42)	155294 (0.42)
≥ 2	36383 (0.20)	42301 (0.18)	45991 (0.17)	48577 (0.16)	50448 (0.16)	51936 (0.15)	53154 (0.15)
≥ 3	12851 (0.07)	14466 (0.06)	15294 (0.06)	15820 (0.05)	16212 (0.05)	16480 (0.05)	16684 (0.05)
3 episodes							
n	8513	27596	46653	64648	81033	96204	109645
≥ 1	5416 (0.69)	16901 (0.66)	27698 (0.65)	37308 (0.63)	45655 (0.61)	52955 (0.60)	59089 (0.59)
≥ 2	2979 (0.40)	8825 (0.36)	14090 (0.34)	18363 (0.32)	21861 (0.31)	24697 (0.29)	26955 (0.28)
≥ 3	1408 (0.19)	4042 (0.17)	6162 (0.15)	7702 (0.14)	8931 (0.13)	9821 (0.12)	10502 (0.11)

Table S3: IORD Frequencies of women with further UTI episodes within 12 months following the time they met the rUTI definition for the first time, stratified by age. Numbers in brackets are Kaplan-Meier estimates of the probability of having at least the stated number of further UTIs within 12 months.

Further UTIs within age group	Timeframe within which UTI episodes must occur to satisfy each rUTI definition						
	3 months	4 months	5 months	6 months	7 months	8 months	9 months
IORD positive cultures							
2 episodes							
Overall, n	10457	12722	14322	15617	16718	17579	18352
16-19, n	332	413	477	538	592	617	662
≥ 1	107 (0.34)	129 (0.33)	148 (0.32)	165 (0.32)	179 (0.32)	187 (0.32)	192 (0.31)
≥ 2	27 (0.09)	35 (0.09)	39 (0.09)	42 (0.08)	47 (0.09)	49 (0.09)	51 (0.08)
≥ 3	12 (0.04)	13 (0.03)	13 (0.03)	13 (0.03)	15 (0.03)	15 (0.03)	15 (0.02)
20-29, n	906	1117	1286	1420	1544	1645	1712
≥ 1	275 (0.31)	339 (0.32)	379 (0.31)	399 (0.29)	418 (0.28)	442 (0.28)	456 (0.28)
≥ 2	101 (0.12)	126 (0.12)	135 (0.11)	142 (0.11)	146 (0.10)	149 (0.10)	152 (0.09)
≥ 3	29 (0.03)	38 (0.04)	41 (0.03)	40 (0.03)	43 (0.03)	44 (0.03)	46 (0.03)
30-39, n	776	964	1116	1235	1345	1412	1478
≥ 1	232 (0.31)	277 (0.30)	318 (0.30)	343 (0.29)	362 (0.28)	371 (0.27)	383 (0.27)
≥ 2	72 (0.10)	92 (0.10)	103 (0.10)	103 (0.09)	107 (0.08)	108 (0.08)	109 (0.08)
≥ 3	18 (0.03)	22 (0.02)	26 (0.03)	24 (0.02)	25 (0.02)	28 (0.02)	26 (0.02)
40-49, n	782	988	1120	1241	1332	1420	1511
≥ 1	318 (0.43)	381 (0.41)	410 (0.39)	438 (0.37)	460 (0.36)	478 (0.35)	500 (0.35)
≥ 2	111 (0.15)	137 (0.15)	147 (0.14)	154 (0.13)	162 (0.13)	164 (0.12)	171 (0.12)
≥ 3	34 (0.05)	43 (0.05)	47 (0.05)	52 (0.05)	54 (0.04)	56 (0.04)	56 (0.04)
50-59, n	1023	1241	1448	1584	1707	1805	1895
≥ 1	448 (0.47)	516 (0.44)	574 (0.42)	608 (0.41)	634 (0.40)	661 (0.39)	686 (0.39)
≥ 2	173 (0.19)	190 (0.17)	208 (0.16)	213 (0.15)	216 (0.14)	221 (0.14)	229 (0.13)
≥ 3	58 (0.06)	70 (0.06)	73 (0.06)	67 (0.05)	67 (0.04)	66 (0.04)	67 (0.04)
60-69, n	1513	1854	2086	2277	2424	2558	2668
≥ 1	688 (0.48)	807 (0.46)	885 (0.45)	964 (0.45)	1025 (0.45)	1061 (0.44)	1108 (0.44)
≥ 2	295 (0.21)	344 (0.20)	366 (0.19)	379 (0.18)	394 (0.18)	400 (0.17)	404 (0.17)

≥ 3	99 (0.07)	114 (0.07)	124 (0.07)	130 (0.06)	135 (0.06)	136 (0.06)	135 (0.06)
70-79, n	2116	2592	2873	3122	3331	3481	3620
≥ 1	1071 (0.55)	1261 (0.53)	1362 (0.51)	1450 (0.5)	1504 (0.49)	1533 (0.48)	1568 (0.47)
≥ 2	452 (0.24)	527 (0.23)	551 (0.22)	584 (0.21)	601 (0.20)	608 (0.20)	613 (0.19)
≥ 3	174 (0.09)	207 (0.09)	207 (0.08)	223 (0.08)	230 (0.08)	230 (0.08)	233 (0.07)
80-89, n	2241	2633	2896	3098	3267	3411	3525
≥ 1	1092 (0.55)	1266 (0.54)	1370 (0.53)	1451 (0.53)	1502 (0.52)	1543 (0.51)	1562 (0.50)
≥ 2	496 (0.27)	546 (0.25)	556 (0.23)	585 (0.23)	612 (0.22)	626 (0.22)	637 (0.22)
≥ 3	205 (0.11)	220 (0.10)	226 (0.10)	230 (0.09)	234 (0.09)	233 (0.08)	241 (0.08)
>=90, n	768	920	1020	1102	1176	1230	1281
≥ 1	357 (0.58)	406 (0.55)	455 (0.56)	483 (0.55)	512 (0.55)	524 (0.53)	540 (0.53)
≥ 2	135 (0.25)	159 (0.24)	167 (0.23)	177 (0.22)	186 (0.22)	190 (0.21)	196 (0.21)
≥ 3	48 (0.09)	53 (0.09)	58 (0.08)	60 (0.08)	61 (0.08)	62 (0.07)	61 (0.07)
3 episodes							
Overall, n	592	1657	2658	3491	4251	4899	5445
16-19, n	9	28	44	56	74	92	103
≥ 1	5 (0.56)	9 (0.33)	18 (0.41)	20 (0.38)	25 (0.36)	29 (0.33)	33 (0.33)
≥ 2	3 (0.33)	5 (0.18)	9 (0.21)	9 (0.17)	10 (0.15)	11 (0.13)	13 (0.14)
≥ 3	1 (0.11)	3 (0.11)	4 (0.09)	4 (0.08)	5 (0.07)	6 (0.07)	6 (0.06)
20-29, n	33	97	163	218	271	307	344
≥ 1	21 (0.64)	57 (0.61)	88 (0.55)	114 (0.53)	128 (0.49)	140 (0.47)	153 (0.46)
≥ 2	9 (0.28)	23 (0.25)	40 (0.26)	49 (0.23)	56 (0.22)	58 (0.20)	64 (0.20)
≥ 3	6 (0.19)	7 (0.08)	8 (0.05)	11 (0.05)	13 (0.05)	14 (0.05)	15 (0.05)
30-39, n	32	83	132	174	217	254	282
≥ 1	15 (0.49)	36 (0.45)	57 (0.44)	78 (0.46)	94 (0.44)	100 (0.41)	110 (0.40)
≥ 2	10 (0.34)	19 (0.25)	26 (0.21)	34 (0.21)	36 (0.18)	35 (0.15)	36 (0.14)
≥ 3	3 (0.10)	8 (0.11)	9 (0.07)	14 (0.09)	16 (0.08)	16 (0.07)	17 (0.07)
40-49, n	42	104	171	229	272	315	347
≥ 1	32 (0.82)	69 (0.68)	104 (0.64)	133 (0.61)	150 (0.58)	182 (0.61)	196 (0.60)
≥ 2	15 (0.39)	34 (0.34)	52 (0.33)	60 (0.28)	67 (0.26)	81 (0.28)	95 (0.30)
≥ 3	7 (0.18)	13 (0.13)	17 (0.11)	20 (0.09)	23 (0.09)	28 (0.10)	30 (0.09)
50-59, n	50	134	229	297	372	430	487
≥ 1	27 (0.57)	79 (0.64)	132 (0.62)	170 (0.62)	207 (0.60)	231 (0.58)	255 (0.56)

≥ 2	14 (0.31)	40 (0.34)	62 (0.31)	87 (0.33)	100 (0.30)	110 (0.29)	124 (0.28)
≥ 3	3 (0.07)	12 (0.11)	22 (0.11)	31 (0.12)	37 (0.11)	40 (0.11)	45 (0.11)
60-69, n	87	243	393	522	648	753	834
≥ 1	54 (0.68)	150 (0.65)	240 (0.64)	319 (0.64)	386 (0.62)	427 (0.59)	462 (0.58)
≥ 2	28 (0.37)	76 (0.35)	115 (0.32)	147 (0.31)	173 (0.29)	194 (0.28)	211 (0.27)
≥ 3	19 (0.26)	38 (0.18)	56 (0.16)	63 (0.13)	81 (0.14)	86 (0.13)	91 (0.12)
70-79, n	137	401	622	803	999	1147	1272
≥ 1	91 (0.73)	242 (0.67)	377 (0.66)	489 (0.67)	602 (0.66)	673 (0.64)	733 (0.63)
≥ 2	51 (0.42)	127 (0.37)	192 (0.35)	252 (0.36)	295 (0.34)	336 (0.33)	369 (0.33)
≥ 3	29 (0.24)	71 (0.21)	97 (0.18)	114 (0.17)	128 (0.15)	138 (0.14)	148 (0.14)
80-89, n	158	431	675	889	1038	1190	1309
≥ 1	107 (0.75)	283 (0.73)	410 (0.68)	533 (0.67)	612 (0.66)	683 (0.64)	742 (0.64)
≥ 2	66 (0.49)	164 (0.45)	230 (0.41)	298 (0.40)	326 (0.38)	369 (0.37)	388 (0.35)
≥ 3	33 (0.25)	76 (0.22)	106 (0.20)	125 (0.18)	139 (0.17)	159 (0.17)	174 (0.17)
>=90, n	44	136	229	303	360	411	467
≥ 1	26 (0.67)	74 (0.67)	123 (0.65)	168 (0.66)	190 (0.63)	210 (0.62)	233 (0.60)
≥ 2	12 (0.35)	40 (0.40)	69 (0.40)	86 (0.37)	96 (0.36)	102 (0.33)	112 (0.32)
≥ 3	5 (0.15)	15 (0.16)	27 (0.16)	38 (0.18)	41 (0.16)	42 (0.14)	44 (0.13)

CPRD

2 episodes

Overall, n	207635	262930	302235	334487	361808	385254	405038
16-19, n	8428	11026	12740	14160	15419	16484	17344
≥ 1	3183 (0.41)	4014 (0.39)	4604 (0.39)	5084 (0.39)	5445 (0.38)	5711 (0.37)	5954 (0.37)
≥ 2	1028 (0.14)	1270 (0.13)	1433 (0.12)	1552 (0.12)	1634 (0.12)	1700 (0.11)	1749 (0.11)
≥ 3	287 (0.04)	355 (0.04)	393 (0.04)	408 (0.03)	437 (0.03)	454 (0.03)	465 (0.03)
20-29, n	26442	34675	40576	45403	49498	53128	56139
≥ 1	9400 (0.39)	11876 (0.38)	13503 (0.37)	14853 (0.36)	15888 (0.35)	16740 (0.35)	17479 (0.34)
≥ 2	3000 (0.13)	3666 (0.12)	4036 (0.12)	4331 (0.11)	4568 (0.11)	4737 (0.10)	4903 (0.10)
≥ 3	859 (0.04)	1016 (0.04)	1092 (0.03)	1146 (0.03)	1192 (0.03)	1216 (0.03)	1234 (0.03)
30-39, n	20635	27030	31765	35863	39323	42332	44906
≥ 1	7833 (0.41)	9933 (0.40)	11255 (0.38)	12383 (0.37)	13313 (0.37)	14037 (0.36)	14678 (0.35)
≥ 2	2618 (0.14)	3197 (0.13)	3530 (0.13)	3809 (0.12)	4029 (0.12)	4161 (0.11)	4279 (0.11)
≥ 3	797 (0.04)	949 (0.04)	1024 (0.04)	1078 (0.03)	1109 (0.03)	1135 (0.03)	1157 (0.03)

40-49, n	22714	29553	34602	38836	42542	45679	48386
≥ 1	9351 (0.44)	11729 (0.42)	13326 (0.41)	14572 (0.40)	15607 (0.39)	16412 (0.38)	17147 (0.38)
≥ 2	3375 (0.16)	4004 (0.15)	4408 (0.14)	4708 (0.13)	4931 (0.13)	5107 (0.12)	5254 (0.12)
≥ 3	1101 (0.05)	1253 (0.05)	1325 (0.04)	1389 (0.04)	1431 (0.04)	1466 (0.04)	1486 (0.03)
50-59, n	24886	31647	36615	40928	44506	47608	50317
≥ 1	10723 (0.46)	13106 (0.44)	14766 (0.43)	16043 (0.42)	17005 (0.41)	17843 (0.40)	18513 (0.39)
≥ 2	4045 (0.18)	4780 (0.17)	5198 (0.16)	5465 (0.15)	5672 (0.14)	5860 (0.13)	6008 (0.13)
≥ 3	1363 (0.06)	1548 (0.05)	1637 (0.05)	1707 (0.05)	1719 (0.04)	1732 (0.04)	1761 (0.04)
60-69, n	28888	36365	41684	45880	49512	52668	55388
≥ 1	13404 (0.49)	16331 (0.48)	18259 (0.46)	19749 (0.46)	20944 (0.45)	21830 (0.44)	22612 (0.43)
≥ 2	5423 (0.21)	6278 (0.19)	6825 (0.18)	7207 (0.17)	7461 (0.16)	7635 (0.16)	7811 (0.15)
≥ 3	1933 (0.07)	2171 (0.07)	2304 (0.06)	2376 (0.06)	2427 (0.05)	2443 (0.05)	2465 (0.05)
70-79, n	34019	41785	47148	51343	54913	57964	60496
≥ 1	17129 (0.54)	20333 (0.52)	22376 (0.51)	23904 (0.5)	25079 (0.49)	25955 (0.48)	26727 (0.47)
≥ 2	7421 (0.24)	8444 (0.22)	9131 (0.21)	9544 (0.21)	9817 (0.20)	10082 (0.19)	10279 (0.19)
≥ 3	2735 (0.09)	3017 (0.08)	3184 (0.08)	3253 (0.07)	3329 (0.07)	3391 (0.07)	3417 (0.06)
80-89, n	29315	35717	40065	43552	46461	48781	50676
≥ 1	14979 (0.58)	17560 (0.55)	19277 (0.54)	20599 (0.53)	21572 (0.52)	22386 (0.52)	22978 (0.51)
≥ 2	6781 (0.28)	7636 (0.26)	8171 (0.24)	8537 (0.23)	8803 (0.23)	9042 (0.22)	9191 (0.22)
≥ 3	2702 (0.12)	2953 (0.10)	3070 (0.10)	3155 (0.09)	3224 (0.09)	3276 (0.08)	3317 (0.08)
≥90, n	12308	15132	17040	18522	19634	20610	21386
≥ 1	5974 (0.60)	7041 (0.58)	7714 (0.57)	8232 (0.55)	8656 (0.55)	8975 (0.54)	9206 (0.54)
≥ 2	2692 (0.31)	3026 (0.28)	3259 (0.27)	3424 (0.26)	3533 (0.25)	3612 (0.24)	3680 (0.24)
≥ 3	1074 (0.13)	1204 (0.12)	1265 (0.11)	1308 (0.11)	1344 (0.10)	1367 (0.10)	1382 (0.10)
3 episodes							
Overall, n	8513	27596	46653	64648	81033	96204	109645
16-19, n	198	739	1301	1852	2360	2806	3245
≥ 1	105 (0.57)	365 (0.54)	642 (0.53)	879 (0.51)	1107 (0.50)	1301 (0.50)	1470 (0.48)
≥ 2	49 (0.28)	141 (0.21)	253 (0.22)	340 (0.21)	418 (0.20)	486 (0.19)	550 (0.19)
≥ 3	18 (0.11)	59 (0.09)	96 (0.08)	128 (0.08)	155 (0.08)	181 (0.07)	196 (0.07)
20-29, n	706	2377	4255	6215	8019	9760	11343
≥ 1	347 (0.54)	1188 (0.54)	2066 (0.53)	2914 (0.51)	3663 (0.50)	4377 (0.49)	4982 (0.48)
≥ 2	149 (0.24)	494 (0.24)	836 (0.23)	1144 (0.21)	1410 (0.20)	1670 (0.20)	1837 (0.19)

≥ 3	69 (0.11)	195 (0.10)	303 (0.09)	397 (0.08)	484 (0.07)	542 (0.07)	604 (0.06)
30-39, n	567	1888	3458	5043	6615	8041	9355
≥ 1	318 (0.61)	1049 (0.60)	1853 (0.58)	2579 (0.55)	3317 (0.54)	3953 (0.53)	4523 (0.53)
≥ 2	144 (0.29)	476 (0.28)	836 (0.27)	1148 (0.26)	1419 (0.24)	1633 (0.23)	1805 (0.22)
≥ 3	49 (0.10)	189 (0.12)	306 (0.10)	396 (0.09)	488 (0.09)	561 (0.08)	602 (0.07)
40-49, n	704	2414	4181	6003	7695	9354	10933
≥ 1	436 (0.65)	1446 (0.63)	2421 (0.61)	3359 (0.59)	4191 (0.58)	4940 (0.56)	5646 (0.55)
≥ 2	241 (0.37)	734 (0.33)	1165 (0.30)	1563 (0.28)	1925 (0.27)	2180 (0.25)	2419 (0.24)
≥ 3	110 (0.17)	325 (0.15)	492 (0.13)	621 (0.11)	739 (0.11)	812 (0.10)	875 (0.09)
50-59, n	906	2969	5139	7306	9231	11114	12763
≥ 1	578 (0.67)	1829 (0.65)	3085 (0.63)	4221 (0.61)	5181 (0.59)	6085 (0.58)	6839 (0.57)
≥ 2	309 (0.37)	958 (0.35)	1561 (0.33)	2051 (0.31)	2430 (0.29)	2777 (0.27)	3035 (0.26)
≥ 3	155 (0.19)	437 (0.16)	676 (0.15)	839 (0.13)	990 (0.12)	1099 (0.11)	1173 (0.10)
60-69, n	1253	4002	6764	9341	11731	13987	15903
≥ 1	838 (0.70)	2541 (0.67)	4112 (0.65)	5606 (0.64)	6826 (0.62)	7945 (0.60)	8878 (0.59)
≥ 2	466 (0.40)	1353 (0.37)	2167 (0.35)	2852 (0.33)	3383 (0.31)	3817 (0.30)	4202 (0.29)
≥ 3	227 (0.20)	617 (0.17)	965 (0.16)	1217 (0.14)	1387 (0.13)	1529 (0.12)	1626 (0.11)
70-79, n	1835	5768	9384	12575	15505	18160	20451
≥ 1	1231 (0.72)	3751 (0.70)	5983 (0.68)	7838 (0.67)	9517 (0.66)	10943 (0.64)	12030 (0.63)
≥ 2	718 (0.44)	2076 (0.40)	3199 (0.38)	4010 (0.35)	4755 (0.34)	5346 (0.33)	5772 (0.31)
≥ 3	337 (0.21)	976 (0.19)	1448 (0.18)	1780 (0.16)	2023 (0.15)	2188 (0.14)	2324 (0.13)
80-89, n	1660	5303	8631	11533	14054	16234	18121
≥ 1	1123 (0.76)	3413 (0.72)	5450 (0.70)	7109 (0.69)	8489 (0.68)	9600 (0.66)	10541 (0.65)
≥ 2	654 (0.47)	1881 (0.42)	2965 (0.41)	3779 (0.39)	4408 (0.37)	4884 (0.36)	5269 (0.35)
≥ 3	317 (0.24)	903 (0.21)	1377 (0.20)	1692 (0.18)	1943 (0.17)	2106 (0.16)	2256 (0.15)
>=90, n	684	2136	3540	4780	5823	6748	7531
≥ 1	440 (0.78)	1319 (0.74)	2086 (0.72)	2803 (0.71)	3364 (0.70)	3811 (0.69)	4180 (0.68)
≥ 2	249 (0.48)	712 (0.44)	1108 (0.43)	1476 (0.42)	1713 (0.40)	1904 (0.38)	2066 (0.37)
≥ 3	126 (0.27)	341 (0.23)	499 (0.21)	632 (0.19)	722 (0.18)	803 (0.17)	846 (0.16)

Table S4: CPRD Frequencies of women with further UTI episodes within 12 months following the time they met the rUTI definition for the first time, stratified by age. Numbers in brackets are Kaplan-Meier estimates of the probability of having at least the stated number of further UTIs within 12 months.

Further UTIs within age group	Timeframe within which UTI episodes must occur to satisfy each rUTI definition						
	3 months	4 months	5 months	6 months	7 months	8 months	9 months
CPRD							
2 episodes							
Overall, n	207635	262930	302235	334487	361808	385254	405038
16-19, n	8428	11026	12740	14160	15419	16484	17344
≥ 1	3183 (0.41)	4014 (0.39)	4604 (0.39)	5084 (0.39)	5445 (0.38)	5711 (0.37)	5954 (0.37)
≥ 2	1028 (0.14)	1270 (0.13)	1433 (0.12)	1552 (0.12)	1634 (0.12)	1700 (0.11)	1749 (0.11)
≥ 3	287 (0.04)	355 (0.04)	393 (0.04)	408 (0.03)	437 (0.03)	454 (0.03)	465 (0.03)
20-29, n	26442	34675	40576	45403	49498	53128	56139
≥ 1	9400 (0.39)	11876 (0.38)	13503 (0.37)	14853 (0.36)	15888 (0.35)	16740 (0.35)	17479 (0.34)
≥ 2	3000 (0.13)	3666 (0.12)	4036 (0.12)	4331 (0.11)	4568 (0.11)	4737 (0.10)	4903 (0.10)
≥ 3	859 (0.04)	1016 (0.04)	1092 (0.03)	1146 (0.03)	1192 (0.03)	1216 (0.03)	1234 (0.03)
30-39, n	20635	27030	31765	35863	39323	42332	44906
≥ 1	7833 (0.41)	9933 (0.40)	11255 (0.38)	12383 (0.37)	13313 (0.37)	14037 (0.36)	14678 (0.35)
≥ 2	2618 (0.14)	3197 (0.13)	3530 (0.13)	3809 (0.12)	4029 (0.12)	4161 (0.11)	4279 (0.11)
≥ 3	797 (0.04)	949 (0.04)	1024 (0.04)	1078 (0.03)	1109 (0.03)	1135 (0.03)	1157 (0.03)
40-49, n	22714	29553	34602	38836	42542	45679	48386
≥ 1	9351 (0.44)	11729 (0.42)	13326 (0.41)	14572 (0.40)	15607 (0.39)	16412 (0.38)	17147 (0.38)
≥ 2	3375 (0.16)	4004 (0.15)	4408 (0.14)	4708 (0.13)	4931 (0.13)	5107 (0.12)	5254 (0.12)
≥ 3	1101 (0.05)	1253 (0.05)	1325 (0.04)	1389 (0.04)	1431 (0.04)	1466 (0.04)	1486 (0.03)
50-59, n	24886	31647	36615	40928	44506	47608	50317
≥ 1	10723 (0.46)	13106 (0.44)	14766 (0.43)	16043 (0.42)	17005 (0.41)	17843 (0.40)	18513 (0.39)
≥ 2	4045 (0.18)	4780 (0.17)	5198 (0.16)	5465 (0.15)	5672 (0.14)	5860 (0.13)	6008 (0.13)
≥ 3	1363 (0.06)	1548 (0.05)	1637 (0.05)	1707 (0.05)	1719 (0.04)	1732 (0.04)	1761 (0.04)
60-69, n	28888	36365	41684	45880	49512	52668	55388
≥ 1	13404 (0.49)	16331 (0.48)	18259 (0.46)	19749 (0.46)	20944 (0.45)	21830 (0.44)	22612 (0.43)
≥ 2	5423 (0.21)	6278 (0.19)	6825 (0.18)	7207 (0.17)	7461 (0.16)	7635 (0.16)	7811 (0.15)

≥ 3	1933 (0.07)	2171 (0.07)	2304 (0.06)	2376 (0.06)	2427 (0.05)	2443 (0.05)	2465 (0.05)
70-79, n	34019	41785	47148	51343	54913	57964	60496
≥ 1	17129 (0.54)	20333 (0.52)	22376 (0.51)	23904 (0.5)	25079 (0.49)	25955 (0.48)	26727 (0.47)
≥ 2	7421 (0.24)	8444 (0.22)	9131 (0.21)	9544 (0.21)	9817 (0.20)	10082 (0.19)	10279 (0.19)
≥ 3	2735 (0.09)	3017 (0.08)	3184 (0.08)	3253 (0.07)	3329 (0.07)	3391 (0.07)	3417 (0.06)
80-89, n	29315	35717	40065	43552	46461	48781	50676
≥ 1	14979 (0.58)	17560 (0.55)	19277 (0.54)	20599 (0.53)	21572 (0.52)	22386 (0.52)	22978 (0.51)
≥ 2	6781 (0.28)	7636 (0.26)	8171 (0.24)	8537 (0.23)	8803 (0.23)	9042 (0.22)	9191 (0.22)
≥ 3	2702 (0.12)	2953 (0.10)	3070 (0.10)	3155 (0.09)	3224 (0.09)	3276 (0.08)	3317 (0.08)
>=90, n	12308	15132	17040	18522	19634	20610	21386
≥ 1	5974 (0.60)	7041 (0.58)	7714 (0.57)	8232 (0.55)	8656 (0.55)	8975 (0.54)	9206 (0.54)
≥ 2	2692 (0.31)	3026 (0.28)	3259 (0.27)	3424 (0.26)	3533 (0.25)	3612 (0.24)	3680 (0.24)
≥ 3	1074 (0.13)	1204 (0.12)	1265 (0.11)	1308 (0.11)	1344 (0.10)	1367 (0.10)	1382 (0.10)
3 episodes							
Overall, n	8513	27596	46653	64648	81033	96204	109645
16-19, n	198	739	1301	1852	2360	2806	3245
≥ 1	105 (0.57)	365 (0.54)	642 (0.53)	879 (0.51)	1107 (0.50)	1301 (0.50)	1470 (0.48)
≥ 2	49 (0.28)	141 (0.21)	253 (0.22)	340 (0.21)	418 (0.20)	486 (0.19)	550 (0.19)
≥ 3	18 (0.11)	59 (0.09)	96 (0.08)	128 (0.08)	155 (0.08)	181 (0.07)	196 (0.07)
20-29, n	706	2377	4255	6215	8019	9760	11343
≥ 1	347 (0.54)	1188 (0.54)	2066 (0.53)	2914 (0.51)	3663 (0.50)	4377 (0.49)	4982 (0.48)
≥ 2	149 (0.24)	494 (0.24)	836 (0.23)	1144 (0.21)	1410 (0.20)	1670 (0.20)	1837 (0.19)
≥ 3	69 (0.11)	195 (0.10)	303 (0.09)	397 (0.08)	484 (0.07)	542 (0.07)	604 (0.06)
30-39, n	567	1888	3458	5043	6615	8041	9355
≥ 1	318 (0.61)	1049 (0.60)	1853 (0.58)	2579 (0.55)	3317 (0.54)	3953 (0.53)	4523 (0.53)
≥ 2	144 (0.29)	476 (0.28)	836 (0.27)	1148 (0.26)	1419 (0.24)	1633 (0.23)	1805 (0.22)
≥ 3	49 (0.10)	189 (0.12)	306 (0.10)	396 (0.09)	488 (0.09)	561 (0.08)	602 (0.07)
40-49, n	704	2414	4181	6003	7695	9354	10933
≥ 1	436 (0.65)	1446 (0.63)	2421 (0.61)	3359 (0.59)	4191 (0.58)	4940 (0.56)	5646 (0.55)
≥ 2	241 (0.37)	734 (0.33)	1165 (0.30)	1563 (0.28)	1925 (0.27)	2180 (0.25)	2419 (0.24)
≥ 3	110 (0.17)	325 (0.15)	492 (0.13)	621 (0.11)	739 (0.11)	812 (0.10)	875 (0.09)
50-59, n	906	2969	5139	7306	9231	11114	12763
≥ 1	578 (0.67)	1829 (0.65)	3085 (0.63)	4221 (0.61)	5181 (0.59)	6085 (0.58)	6839 (0.57)

≥ 2	309 (0.37)	958 (0.35)	1561 (0.33)	2051 (0.31)	2430 (0.29)	2777 (0.27)	3035 (0.26)
≥ 3	155 (0.19)	437 (0.16)	676 (0.15)	839 (0.13)	990 (0.12)	1099 (0.11)	1173 (0.10)
60-69, n	1253	4002	6764	9341	11731	13987	15903
≥ 1	838 (0.70)	2541 (0.67)	4112 (0.65)	5606 (0.64)	6826 (0.62)	7945 (0.60)	8878 (0.59)
≥ 2	466 (0.40)	1353 (0.37)	2167 (0.35)	2852 (0.33)	3383 (0.31)	3817 (0.30)	4202 (0.29)
≥ 3	227 (0.20)	617 (0.17)	965 (0.16)	1217 (0.14)	1387 (0.13)	1529 (0.12)	1626 (0.11)
70-79, n	1835	5768	9384	12575	15505	18160	20451
≥ 1	1231 (0.72)	3751 (0.70)	5983 (0.68)	7838 (0.67)	9517 (0.66)	10943 (0.64)	12030 (0.63)
≥ 2	718 (0.44)	2076 (0.40)	3199 (0.38)	4010 (0.35)	4755 (0.34)	5346 (0.33)	5772 (0.31)
≥ 3	337 (0.21)	976 (0.19)	1448 (0.18)	1780 (0.16)	2023 (0.15)	2188 (0.14)	2324 (0.13)
80-89, n	1660	5303	8631	11533	14054	16234	18121
≥ 1	1123 (0.76)	3413 (0.72)	5450 (0.70)	7109 (0.69)	8489 (0.68)	9600 (0.66)	10541 (0.65)
≥ 2	654 (0.47)	1881 (0.42)	2965 (0.41)	3779 (0.39)	4408 (0.37)	4884 (0.36)	5269 (0.35)
≥ 3	317 (0.24)	903 (0.21)	1377 (0.20)	1692 (0.18)	1943 (0.17)	2106 (0.16)	2256 (0.15)
>=90, n	684	2136	3540	4780	5823	6748	7531
≥ 1	440 (0.78)	1319 (0.74)	2086 (0.72)	2803 (0.71)	3364 (0.70)	3811 (0.69)	4180 (0.68)
≥ 2	249 (0.48)	712 (0.44)	1108 (0.43)	1476 (0.42)	1713 (0.40)	1904 (0.38)	2066 (0.37)
≥ 3	126 (0.27)	341 (0.23)	499 (0.21)	632 (0.19)	722 (0.18)	803 (0.17)	846 (0.16)

Table S5: Percentage agreement (95% confidence interval) between base rUTI definition and alternative definitions. ‘Positive percentage agreement’ refers to the percentage of women classified as having rUTI under the base definition who were also classified as having rUTI under the alternative proposed definition. ‘Negative percentage agreement’ refers to the percentage of women classified as not having rUTI under the base definition who were also classified as not having rUTI under the alternative proposed definition. ‘Overall percentage agreement’ refers to the percentage of women whose classification (whether rUTI or not) matched under the base definition and the alternative proposed definition.

For example, in the IORD positive cultures section, of the women classified as having rUTI under the base definition (2 UTIs in 6 months), 67.0% were also classified as having rUTI under the ‘2 UTIs within 3 months’ definition, and 22.4% were classified as having rUTI under the ‘3 UTIs within 6 months’ definition.

Percentage agreement	Timeframe within which UTI episodes must occur to satisfy each rUTI definition						
	3 months	4 months	5 months	6 months	7 months	8 months	9 months
IORD positive cultures							
2 episodes							
Overall	93.9 (93.8, 94.1)	96.6 (96.5, 96.7)	98.5 (98.4, 98.6)		98.7 (98.6, 98.8)	97.7 (97.6, 97.8)	96.8 (96.7, 96.9)
Positive	67.0 (66.6, 67.3)	81.5 (81.2, 81.7)	91.7 (91.5, 91.9)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		98.4 (98.3, 98.5)	97.2 (97.1, 97.3)	96.1 (95.9, 96.2)
3 episodes							
Overall	82.3 (82.0, 82.5)	83.5 (83.3, 83.8)	84.7 (84.5, 85.0)	85.7 (85.5, 85.9)	86.6 (86.4, 86.8)	87.4 (87.1, 87.6)	88.0 (87.8, 88.2)
Positive	3.8 (3.7, 3.9)	10.6 (10.4, 10.8)	17.0 (16.8, 17.3)	22.4 (22.1, 22.6)	27.2 (26.9, 27.5)	31.4 (31.1, 31.7)	34.9 (34.6, 35.2)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)	100 (100, 100)	100 (100, 100)	100 (100, 100)	100 (100, 100)
IORD all cultures							
2 episodes							
Overall	90.6 (90.5, 90.7)	94.7 (94.6, 94.8)	97.5 (97.5, 97.6)		98.0 (97.9, 98.0)	96.7 (96.6, 96.7)	95.6 (95.5, 95.7)
Positive	70.5 (70.3, 70.7)	83.2 (83.1, 83.4)	92.3 (92.2, 92.4)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		97.0 (97.0, 97.1)	95.1 (95.0, 95.2)	93.6 (93.5, 93.7)
3 episodes							
Overall	69.8 (69.6, 70)	72.7 (72.5, 72.9)	75.3 (75.1, 75.4)	77.4 (77.3, 77.6)	79.2 (79.1, 79.4)	80.6 (80.4, 80.7)	81.5 (81.4, 81.7)
Positive	5.0 (4.9, 5.1)	14.2 (14.0, 14.3)	22.3 (22.1, 22.4)	29.1 (28.9, 29.3)	34.8 (34.6, 35.0)	39.0 (38.8, 39.2)	42.0 (41.8, 42.2)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)	100 (100, 100)	100 (100, 100)	100 (100, 100)	100 (100, 100)
CPRD							
2 episodes							

Table S6: IORD Percentage agreement (95% confidence interval) between base rUTI definition and alternative definitions, stratified by age. See Table S5 for definitions.

Percentage agreement by age group	Timeframe within which UTI episodes must occur to satisfy each rUTI definition						
	3 months	4 months	5 months	6 months	7 months	8 months	9 months
IORD positive cultures							
2 episodes							
<i>16-19</i>							
Overall	95.3 (94.8, 95.9)	97.2 (96.8, 97.6)	98.6 (98.3, 98.9)		98.8 (98.5, 99.1)	98.3 (97.9, 98.6)	97.4 (97.0, 97.8)
Positive	63.5 (62.2, 64.8)	78.2 (77.1, 79.3)	89.4 (88.6, 90.2)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		98.7 (98.4, 99.0)	98.0 (97.6, 98.4)	97.0 (96.6, 97.5)
<i>20-29</i>							
Overall	96.2 (95.9, 96.5)	97.7 (97.4, 97.9)	99.0 (98.8, 99.2)		99.0 (98.8, 99.1)	98.3 (98.0, 98.5)	97.7 (97.5, 98.0)
Positive	64.3 (63.5, 65.1)	78.4 (77.7, 79.1)	90.7 (90.2, 91.2)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		98.9 (98.7, 99.0)	98.0 (97.8, 98.3)	97.4 (97.2, 97.7)
<i>30-39</i>							
Overall	95.8 (95.4, 96.2)	97.6 (97.3, 97.9)	99.0 (98.8, 99.1)		99.1 (98.9, 99.3)	98.4 (98.1, 98.6)	97.8 (97.5, 98.0)
Positive	62.6 (61.7, 63.5)	78.7 (77.9, 79.5)	90.8 (90.2, 91.3)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		99.0 (98.8, 99.2)	98.2 (97.9, 98.4)	97.5 (97.2, 97.8)
<i>40-49</i>							
Overall	94.9 (94.4, 95.3)	97.1 (96.8, 97.4)	98.6 (98.4, 98.8)		98.9 (98.7, 99.1)	98.0 (97.7, 98.3)	97.0 (96.6, 97.3)
Positive	64.1 (63.2, 65.1)	79.8 (79, 80.6)	90.3 (89.7, 90.9)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		98.7 (98.5, 99.0)	97.7 (97.3, 98.0)	96.5 (96.1, 96.9)
<i>50-59</i>							
Overall	94.1 (93.6, 94.6)	96.6 (96.2, 96.9)	98.5 (98.3, 98.7)		98.8 (98.6, 99.0)	97.9 (97.6, 98.1)	96.9 (96.6, 97.3)
Positive	64.3 (63.4, 65.3)	79.3 (78.5, 80.1)	91 (90.4, 91.5)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		98.6 (98.4, 98.8)	97.4 (97.1, 97.8)	96.3 (96.0, 96.7)
<i>60-69</i>							
Overall	92.6 (92.1, 93.1)	95.9 (95.6, 96.3)	98.2 (98, 98.5)		98.7 (98.5, 98.9)	97.5 (97.2, 97.8)	96.5 (96.1, 96.8)
Positive	68.2 (67.3, 69)	82.4 (81.7, 83.1)	92.3 (91.8, 92.8)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		98.3 (98.1, 98.6)	96.7 (96.4, 97.1)	95.4 (95.0, 95.8)

Table S7: CPRD Percentage agreement (95% confidence interval) between base rUTI definition and alternative definitions, stratified by age. See Table S5 for definitions.

Percentage agreement by age group	Timeframe within which UTI episodes must occur to satisfy each rUTI definition						
	3 months	4 months	5 months	6 months	7 months	8 months	9 months
CPRD							
2 episodes							
<i>16-19</i>							
Overall	92.5 (92.3, 92.6)	95.9 (95.8, 96)	98.1 (98, 98.2)		98.3 (98.3, 98.4)	96.9 (96.8, 97)	95.8 (95.7, 95.9)
Positive	60.4 (60.1, 60.7)	78.3 (78.1, 78.6)	90 (89.8, 90.2)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		98 (97.9, 98.1)	96.2 (96.1, 96.3)	94.8 (94.7, 94.9)
<i>20-29</i>							
Overall	93.8 (93.8, 93.9)	96.5 (96.4, 96.6)	98.4 (98.4, 98.5)		98.7 (98.6, 98.7)	97.5 (97.4, 97.6)	96.5 (96.5, 96.6)
Positive	58.2 (58, 58.3)	76.3 (76.1, 76.4)	89.3 (89.2, 89.5)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		98.4 (98.4, 98.5)	97.1 (97, 97.1)	95.9 (95.9, 96)
<i>30-39</i>							
Overall	93.7 (93.6, 93.8)	96.3 (96.3, 96.4)	98.3 (98.3, 98.4)		98.6 (98.5, 98.6)	97.3 (97.3, 97.4)	96.3 (96.2, 96.3)
Positive	57.6 (57.5, 57.8)	75.5 (75.3, 75.6)	88.7 (88.6, 88.8)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		98.3 (98.3, 98.4)	96.9 (96.8, 97)	95.6 (95.5, 95.7)
<i>40-49</i>							
Overall	93.1 (93, 93.2)	96 (96, 96.1)	98.2 (98.1, 98.2)		98.4 (98.4, 98.5)	97.1 (97, 97.1)	95.9 (95.8, 96)
Positive	59.4 (59.2, 59.6)	76.6 (76.5, 76.8)	89.3 (89.1, 89.4)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		98.1 (98, 98.2)	96.5 (96.4, 96.5)	95.1 (95, 95.2)
<i>50-59</i>							
Overall	92.8 (92.7, 92.9)	95.9 (95.8, 96)	98.1 (98, 98.2)		98.4 (98.3, 98.4)	97 (96.9, 97.1)	95.8 (95.7, 95.9)
Positive	61.3 (61.1, 61.5)	77.8 (77.6, 78)	89.8 (89.7, 89.9)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		98 (97.9, 98.1)	96.3 (96.2, 96.4)	94.8 (94.7, 94.9)
<i>60-69</i>							
Overall	91.6 (91.5, 91.7)	95.3 (95.2, 95.4)	97.9 (97.9, 98)		98.2 (98.2, 98.3)	96.7 (96.6, 96.8)	95.4 (95.3, 95.5)
Positive	64.3 (64.1, 64.5)	80 (79.9, 80.2)	91.2 (91.1, 91.3)		100 (100, 100)	100 (100, 100)	100 (100, 100)
Negative	100 (100, 100)	100 (100, 100)	100 (100, 100)		97.7 (97.6, 97.8)	95.7 (95.6, 95.8)	94 (93.9, 94.1)

Appendix A: Criteria for identifying cases of UTI from the CPRD dataset

Women entered the study at the latest date of: reaching age 16, date of registering at current GP practice, 1st January 2010.

Women exited the study at the earliest date of: death, leaving GP practice, last data download for their GP practice, 31st December 2019.

A case of UTI is defined as a record that contains a code suggestive of UTI diagnosis or a relevant symptom (Code list 1), and at least one of the following:

- 1) A same-day antibiotic prescription (for nitrofurantoin, trimethoprim or cephalexin)
- 2) A same-day hospital admission with a UTI-relevant ICD-10 code (Code list 2)
- 3) A code indicating urine sent for culture (Code list 3) and an antibiotic prescription within 7 days

Code List 1: CPRD Aurum codes suggesting UTI diagnosis or relevant symptom

MedCodeId	Observations	CleansedReadCode	Term	SnomedCTConceptId
459357017	10000000	1J4..00	Suspected UTI (urinary tract infection)	314940005
74781000006117	5000000	K190.00	Urinary tract infection, site not specified	68566005
304323018	900000	K190z00	Urinary tract infection, site not specified NOS	68566005
183171000006116	900000	K190311	Recurrent urinary tract infection	197927001
113884018	300000	K190500	Urinary tract infection	68566005
450831019	300000	1AZ6.00	Lower urinary tract symptoms	307541003
304319014	200000	K190300	Recurrent urinary tract infection	197927001
183141000006112	200000	K190.11	Recurrent urinary tract infection	197927001
183161000006111	200000	1AG..00	Recurrent urinary tract infections	197927001
886811000006115	200000	K190.98	Urinary tract infection NOS	68566005
3615681000006115	100000		Urinary tract infectious disease	68566005
3615701000006117	80000		UTI - Urinary tract infection	68566005
1209801015	60000	K190600	Sepsis due to urinary tract infection	721104000
1726491000006117	50000		LUTS - Lower urinary tract symptoms	1726491000006101
5969611000006118	50000		LUTS - Lower urinary tract symptoms	307541003
450823012	30000	L166z11	UTI - urinary tract infection in pregnancy	307534009

74741000006111	20000		Urinary Tract Infection	74741000006107
7135021000006114	20000		Acute urinary tract infection	431309003
308102012	10000	Lyu2300	Urinary tract infection in pregnancy	307534009
1691621000000118	10000	1AZ6000	Mild lower urinary tract symptoms	763121000000102
2563091000006114	10000		Lower urinary tract infection	4009004
2563101000006115	10000		UTI - Lower urinary tract infection	4009004
2247821000000119	8000	8CMWE00	On urinary tract infection care pathway	869691000000108
1691601000000110	8000	1AZ6100	Moderate lower urinary tract symptoms	763111000000108
1490641019	5000	L166800	Urinary tract infection complicating pregnancy	307534009
216611000006114	4000	K190200	Postoperative urinary tract infection	197926005
2277891000000117	4000	SP07Q00	Catheter-associated urinary tract infection	700372006
1691581000000118	3000	1AZ6200	Severe lower urinary tract symptoms	763101000000106
1761271000006118	3000		[SHHAPT] Urinary tract infection	1761271000006102
305977017	700	L166600	Urinary tract infection following delivery	199111004
5888011000006114	700		Coliform urinary tract infection	301010001
2277901000000116	300	SP07Q11	CAUTI - catheter-associated urinary tract infection	700372006
5888021000006118	200		Escherichia coli urinary tract infection	301011002
6051761000006111	200		Suspected urinary tract infection	314940005
4790241000006110	100		Recurrent UTI - urinary tract infection	197927001
2732301000000110	80		Uncomplicated urinary tract infection	1090711000000102
7135041000006119	20		Acute UTI (urinary tract infection)	431309003
7144721000006113	9		Acute lower urinary tract infection	431737008
7534301000006113	8		Urinary tract infection associated with catheter	700372006
5888041000006113	3		Proteus UTI (urinary tract infection)	301012009
8120631000006117	2		Urinary tract infection caused by Klebsiella	369001000119100
2732311000000112	1		Uncomplicated UTI (urinary tract infection)	1090711000000102
6013071000006113	1		Bacterial UTI (urinary tract infection)	312124009
65119018	2000000	K15..00	Cystitis	38822007
113331011	500000	K150.00	Acute cystitis	68226007
304205011	100000	K155.00	Recurrent cystitis	197853008
304209017	80000	K15z.00	Cystitis NOS	38822007
305203014	1000	Kyu5100	[X]Other cystitis	38822007

304206012	800	K15y.00	Other specified cystitis	38822007
304208013	500	K15yz00	Other cystitis NOS	38822007
411392011	500	L166.11	Cystitis of pregnancy	275412000
8285011	200	K152000	Subacute cystitis	4324001
5533131000006117	1000		Complaining of loin pain	272047006
853721000006115	50000		Left loin pain	853721000006104
407091012	400000	1A53.11	C/O - loin pain	272047006
317575013	400000	R090C00	Loin pain	271857006
254514014	10000	2624.00	O/E - renal angle tenderness	163358002
4081131000006119	1		Renal angle tenderness	102830001
4081161000006111	2		Renal angle pain	102831002
82701015	2000000	1A55.00	Dysuria	49650001
317511010	100000	R081.00	[D]Dysuria	49650001
317514019	40000	R081z00	[D]Dysuria NOS	49650001
57480016	1000000	K197.00	Haematuria	34436003
304349011	400000	K197200	Microscopic haematuria	197940006
518011000006114	400000	1A45.00	Blood in urine - haematuria	53298000
304353013	200000	K197300	Frank haematuria	197941005
304345017	80000	K197000	Painless haematuria	197938001
813391000006111	70000	1A45.12	Haematuria - symptom	34436003
304348015	10000	K197100	Painful haematuria	197939009
886851000006119	10000	K197.99	Haematuria NOS	34436003
303986013	7000	K0A2.00	Recurrent haematuria	281860005
304355018	2000	K197400	Clot haematuria	197942003
962031000006113	1000		Haematuria/abnormal colour	962031000006109
458617017	500	K197.12	Essential haematuria	314280007
4790361000006116	100		Macroscopic haematuria	197941005
5656831000006113	100		Persistent microscopic haematuria	281857003
5656811000006119	20		Recurrent frank haematuria	281856007
5656851000006118	20		Recurrent microscopic haematuria	281858008
5097911000006114	5		Dipstick haematuria	236718002
5656791000006118	2		Persistent frank haematuria	281855006

217701000000114	900000	1A1..13	Urinary frequency	162116003
1490597011	400000	1A12.00	Frequency of micturition	300471006
317529017	200000	R084000	Increased frequency of urination	162116003
794711000006117	200000	1A1..11	Frequency of micturition	300471006
252783013	40000	1A1Z.00	Micturition frequency NOS	300471006
317528013	40000	R084.00	Micturition frequency and polyuria	274734008
5880471000006112	10000		Finding of frequency of urination	300471006
253322014	7000	1D5..00	Symptom frequency	162451001
317534018	7000	R084z00	[D]Frequency of micturition or polyuria NOS	274734008
6255291000006115	7000		Frequency of urination	364198000
961991000006119	5000		Urgency/frequency	961991000006103
4546681000006111	3000		Urinary frequency	162116003
252595010	200000	1979.00	Suprapubic pain	162053006
1807411000006116	70000		Suprapubic tenderness	1807411000006100
317571016	20000	R090800	[D]Suprapubic pain	162053006

Code list 2: ICD-10 codes indicating a hospital diagnosis of UTI

O23.3	Infections of other parts of urinary tract in pregnancy
O23.4	Unspecified infection of urinary tract in pregnancy
O23.9	Other and unspecified genitourinary tract infection in pregnancy
O86.2	Urinary tract infection following delivery
O86.3	Other genitourinary tract infections following delivery
N30	Cystitis
N30.0	Acute cystitis
N30.8	Other cystitis
N30.9	Cystitis, unspecified
N39.0	Urinary tract infection, site not specified

Code list 3: CPRD Aurum code suggesting urine sent for culture

MedCodeId	Observations	CleansedReadCode	Term	SnomedCTConceptId
384760015	600000	4JJ..12	Mid-stream urine sample	269949006
4938441000006114	200		Collection of mid-stream specimen of urine	225271002
5396991000006118	30000		Mid-stream urine sample	258574006
5397001000006114	200		MSU - Mid-stream urine sample	258574006
4602601000006118	40000		Mid stream urine sent to laboratory	167223000
4602641000006116	1		Mid stream urine = abnormal	167225007
259744012	3000000	4615.00	MSU sent to lab.	167223000
261434014	3000000	4JJ1.00	MSU sent for C/S	168336001
259746014	500000	4617.00	MSU = abnormal	167225007
261435010	200000	4JJ2.00	MSU sent for bacteriology	168337005
259749019	20000	461A.00	MSU = equivocal	167228009
917901000006117	5000		MSU sent to lab	917901000006101
185189016	20000000	46U..00	Urine culture	1023711000000100
260289016	300000	46U1.00	Urine culture - no growth	167568007
260290013	60000	46U2.00	Urine culture - mixed growth	167569004
260291012	100000	46U3.00	Urine culture - E. coli	167570003
260292017	9000	46U4.00	Urine culture - Proteus	167571004
260295015	1000	46U6.00	Urine culture - Staph. albus	167573001
260296019	4000	46U7.00	Urine culture - Pseudomonas	167574007
260297011	20000	46U8.00	Urine culture - Bacteria OS	61373006
75491000006112	7000	46U3.11	Urine culture - Escherich.coli	167570003
75551000006117	2000	46U5.00	Urine culture - Streptococcus faecalis	167572006
4280891000006112	3		Urine culture	117010004
4280901000006111	1		Microbial urine culture	117010004
6276321000006118	10		Urine culture: organisms - finding	365697000
411852016	20000	4JJ..13	Urine for culture	269949006
5578061000006119	300		Urine for culture	275885001
259747017	7000000	4618.00	Urine dipstick test	1007881000000101
375933017	8000	4634.00	Urine dipstick for specific gravity	252386004

404515015	300000	4669.00	Urine dipstick for glucose	1003181000000102
405356012	500000	4698.00	Urine dipstick for blood	1030641000000102
406084015	400000	4679.00	Urine dipstick for protein	1030631000000106
406085019	300000	4688.00	Urine dipstick for ketones	1026841000000103
406086018	80000	46A9.00	Urine dipstick for pH	1030701000000107
444679010	200000	46X2.00	Urine dipstick for nitrite	1024001000000102
858001000006118	8000		Urine dipstick for leucocytes	252385000
858011000006115	600000		Urine dipstick leucocytes positive	858011000006104
858021000006111	700000		Urine dipstick leucocytes negative	858021000006107
858031000006114	400		Urine dipstick bilirubin	858031000006105
858041000006116	3000		Urine dipstick bilirubin positive	858041000006100
858051000006119	40000		Urine dipstick bilirubin negative	858051000006103
1656151000000119	1000	8!Ar.00	Urine dipstick test declined	698490005
2559121000006115	1		Ward urine dip stick testing	3770000
4602651000006119	40		Urine dipstick test	167226008
4603401000006110	70		Urine dipstick for urobilinogen	167321001
5315341000006117	60		Urine dipstick for bilirubin	252384001
5315351000006115	300		Urine dipstick for leucocyte esterase	252385000
5315391000006114	2		Urine dipstick for leukocytes	252385000
5514341000006116	200		Urine dipstick for glucose	269879003
5523611000006116	200		Urine dipstick for protein	271346009
5523621000006112	300		Urine dipstick for protein test	271346009
5575631000006110	40		Urine dipstick for haemoglobin	275714003
5911021000006118	1		Urine dipstick for nitrite	302791006
6909171000006117	3		Urine dipstick test finding	417597005
8382991000006111	70		Urine dipstick for glucose	1003181000000102
8411651000006111	100		Urine dipstick for protein	1030631000000106
454409010	8000000	46G9.00	Urine microscopy: red cells	1038641000000104
1220776015	7000000	46Z1.00	Urine microscopy	1014831000000107
404516019	6000000	46G7.00	Urine microscopy: pus cells	1041881000000101
259868014	2000000	46E..00	Finding related to casts on urine microscopy	365689007
1780280011	1000000	46H5.00	Urine microscopy: yeasts	996881000000106

259862010	500000	46D..00	Urine microscopy - general	365686000
259894017	500000	46G3.00	Urine microscopy: epithelial cells	167354004
259908012	400000	46G8.00	Urine Microscopy: white cells	271350002
259864011	100000	46D2.00	Urine microscopy = NAD	167332001
406087010	100000	46G2.00	Urine microscopy:RBC's present	271349002
69191000006112	100000	46E3.00	Urine microscopy: hyaline casts	1038661000000103
259884010	80000	46G..00	Urine microscopy: cells	365683008
259869018	70000	46E1.00	Urine microscopy: no casts	167336003
259872013	50000	46EZ.00	Urine microscopy: casts NOS	365689007
259887015	50000	46G1100	Urine microscopy: no white cells	167352000
259866013	40000	46DZ.00	Urine microscopy - general NOS	365686000
259865012	30000	46D3.00	Urine microscopy = abnormality	167333006
259924013	20000	46H4.00	Urine microscopy: bacteria present	167367001
259925014	20000	46HZ.00	Urine microscopy: orgs/FB's - finding	365696009
404518018	20000	46H..00	Urine microscopy: orgs/FB's	365696009
69081000006113	10000	46E2.00	Urine microscopy: epithelial casts	167337007
259910014	8000	46GZ.00	Urine microscopy: cells	167349008
259885011	7000	46G1.00	Urine microscopy: no cells	167350008
259886012	5000	46G1000	Urine microscopy: no epithelial cells	167351007
69131000006113	5000	46H1.00	Urine microscopy: no organisms or foreign bodies	167363002
6276011000006112	3000		Urine microscopy - general - finding	365686000
259904014	2000	46G6.00	Urine microscopy for percentage of lymphocytes	713587006
4603561000006112	100		Urine microscopy: hyaline casts	167338002
259923019	60	46H3.00	Urine microscopy: parasites present	167366005
4603661000006113	40		Urine microscopy for cells	167349008
4401151000006119	20		Urine microscopy	127800008
4603571000006117	7		Urine microscopy for crystals	167340007
257100012	3000000	4146.00	Urine sample sent to Lab	165339009
404606019	300000	4JJ..00	Urine sample for organism	269949006
457224014	300000	41D1.00	Urine sample obtained	313335001
1864221000006115	70000	4JJ..00	Test request : Urine sample for organism	1864221000006104
384764012	10000	4JJ..11	Early morning urine sample	269949006

261438012	7000	4JJZ.00	Urine sample for organism NOS	269949006
916231000006118	4000		Urine sample obtained	916231000006102
5397011000006112	4000		Early morning urine sample	258575007
917881000006119	2000		Urine sample sent to lab	917881000006103
4350081000006118	2000		Urine sample	122575003
2397341000000115	1000	461C.00	Catheter urine sample	122565001
13796451000006112	600		Urine sample sent for organism evaluation	269949006
7506901000006112	1		First void urine sample	698276005
6546771000006111	4		Urine leukocyte test	394711007
6546791000006112	2		Urine leukocyte test = +	394712000
6546831000006117	1		Urine leukocyte test = ++	394713005
6546871000006119	1		Urine leukocyte test = +++	394714004
6546951000006115	1		Urine leukocyte test negative	394717006
260310010	500000	46X..00	Urine nitrite level	1023721000000106
458434017	2000000	46X0.00	Urine nitrite positive	314137006
458435016	7000000	46X1.00	Urine nitrite negative	314138001
3693421000006117	3		Urine nitrite test	73392001
4604991000006111	1		Urine nitrite	167585009
8061091000006115	5000		Urine nitrite test = +	201231000000104
8061101000006114	4000		Urine nitrite test = ++	201241000000108
8061121000006116	3000		Urine nitrite test = ++++	201261000000109
8061111000006112	4000		Urine nitrite test = +++	201251000000106
8061131000006118	4000		Urine nitrite test = trace	201271000000102
259827017	9000000	4692.00	Urine blood test = negative	167297006
259831011	1000000	4695.00	Urine blood test = +	167300001
259832016	1000000	4696.00	Urine blood test = ++	167301002
259833014	1000000	4697.00	Urine blood test = +++	167302009
259835019	5000	469Z.00	Urine blood test	307821001
451206016	800000	469..00	Urine blood test	1019581000000105
1808141000006114	1		Urine blood test = moderate non-haemolysed blood	1808141000006105