Supplemental table 1: DUTY coefficient elements and weights[a]

Index tests	Odds Ratio (95% CI)
Pain/crying when passing urine	
No problem	1 (ref)
Slight problem	1.73 (0.73-4.06)
Moderate problem	4.80 (2.30-10.04)
Severe problem	15.81 (7.37-33.89)
Smelly urine	
No problem	1 (ref)
Slight problem	4.28 (2.02-9.05)
Moderate problem	5.14 (2.60-10.19)
Severe problem	8.76 (3.76-20.41)
Previous UTI	
No	1 (ref)
Yes	2.66 (1.34-5.26)
Cough	
No problem	1 (ref)
Slight problem	1.32 (0.68-2.55)
Moderate problem	1.38 (0.72-2.68)
Severe problem	0.29 (0.09-0.97)
Clinician global impression of illness severity (0-10)	
0-1	1 (ref)
2	1.98 (0.93-4.19)
3	2.72 (1.28-5.81)
4-5	3.87 (1.72-8.73)
6 or more	7.24 (2.59-20.25)
Abdominal examination: any tenderness	
No	1 (ref)
Yes	2.24 (0.95-5.25)
Ear examination: any acute abnormality	
No	1 (ref)
Yes	0.27 (0.10-0.74)

[a] UTI: urinary tract infection; CI: confidence interval; ref: reference group

Supplemental table 2: DUTY points elements and weights[b]

Clinical Characteristic (Present / Absent)	Points
Pain/crying passing urine	2
Smelly urine	2
Previous UTI	1
Absence of severe cough	2
Severe illness present	2

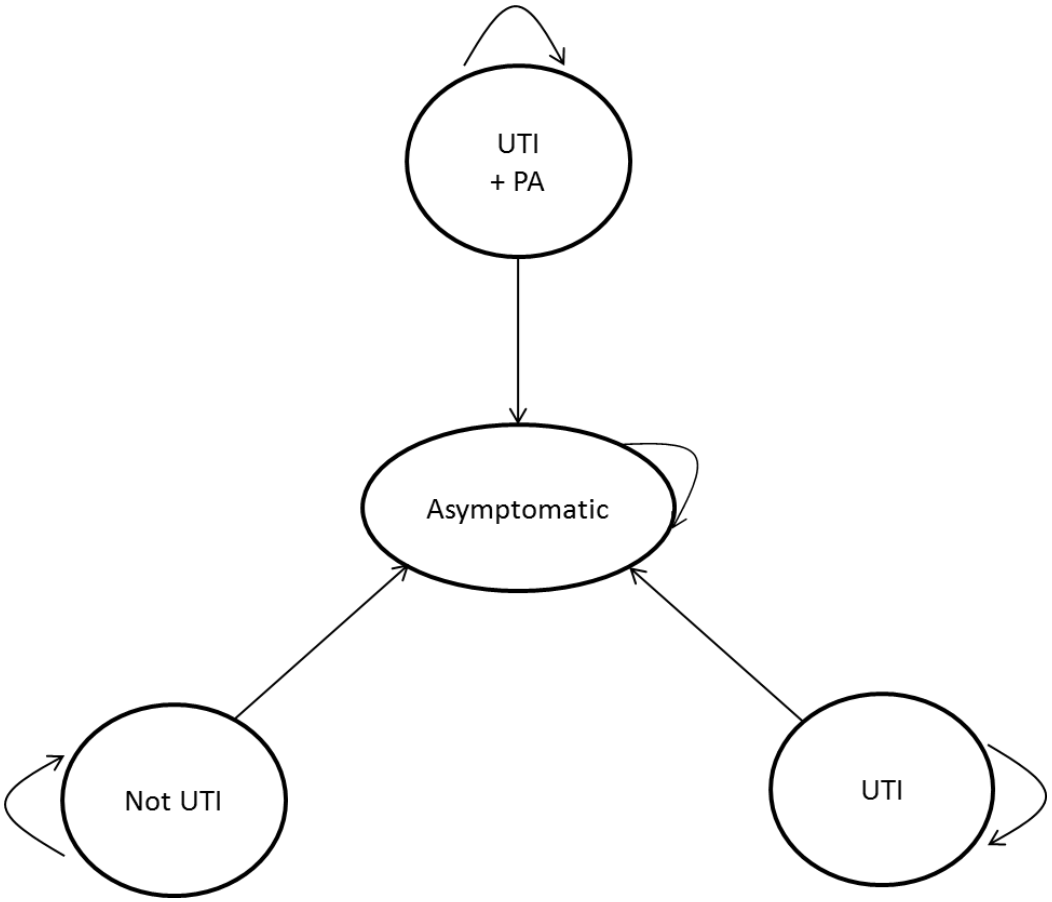
[b] UTI: urinary tract infection. The points-based model was designed to be simple to apply and excluded the two variables (abdominal tenderness and absence of ear abnormalities) that contributed least to the predictive accuracy of the statistical model.

Supplemental table 3: Overview of the DUTY algorithm

Strategy	Intermediate risk cut-point	% of children above intermediate cut-point	Higher risk cut-point	% of children above higher cut-point
Coefficient-based algorithm[c]				
DUTY5%	0.083	4.99	0.142	2.48
DUTY10%	0.041	10.07	0.083	4.99
DUTY20%	0.020	20.88	0.041	10.07
Points-based algorithm[d]				
DUTY≥6	6	4.60	7	0.71
DUTY≥5	5	6.96	6	4.60
DUTY≥4	4	23.04	5	6.96
DUTY≥3	3	27.76	5	6.96

[c] Cut-points represent the probability of urinary tract infection predicted by DUTY coefficient-based algorithm
[d] Cut-points represent the score in DUTY points-based algorithm

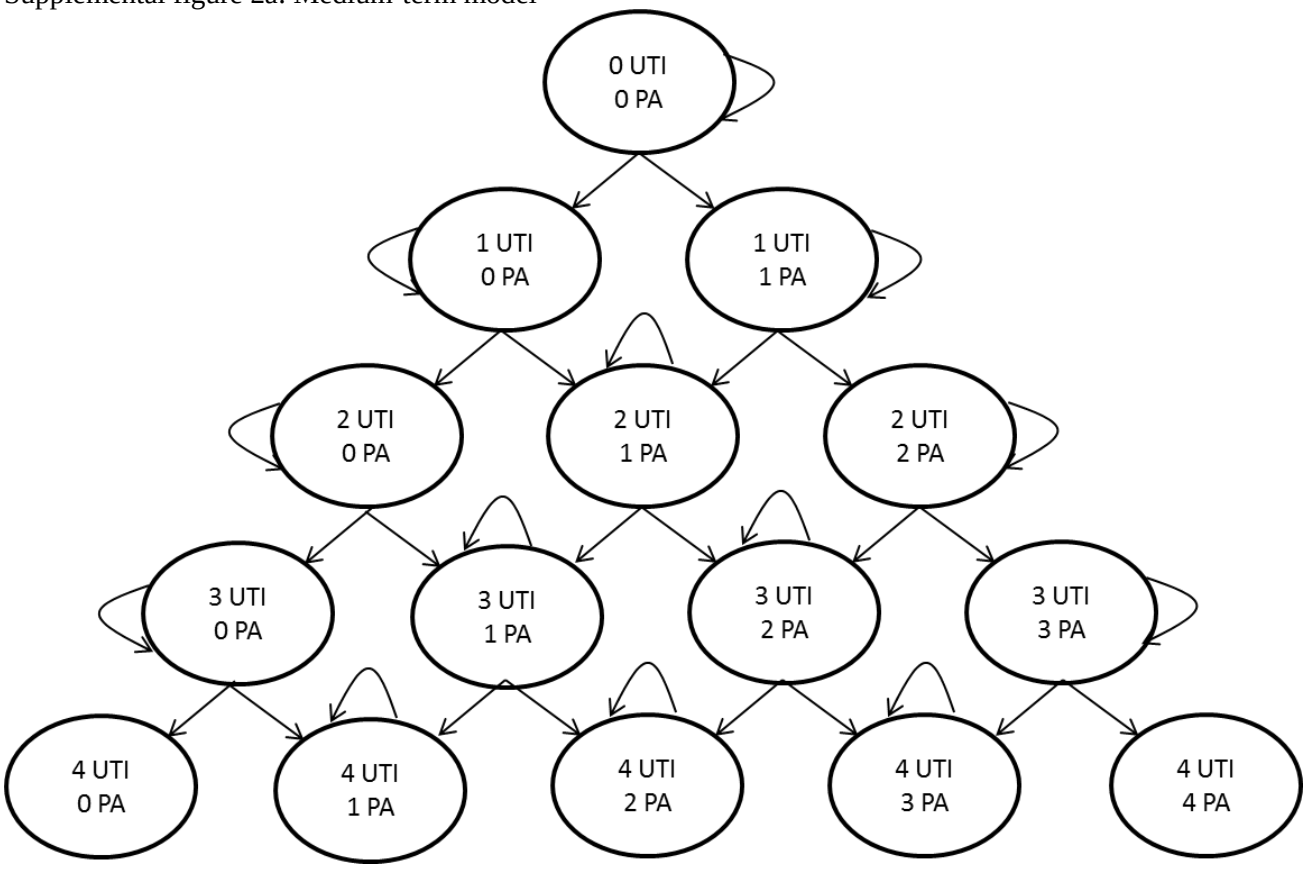
Supplemental figure 1: Short-term Markov model[e] [f]



[e] UTI: urinary tract infection; PA: pyelonephritic attack

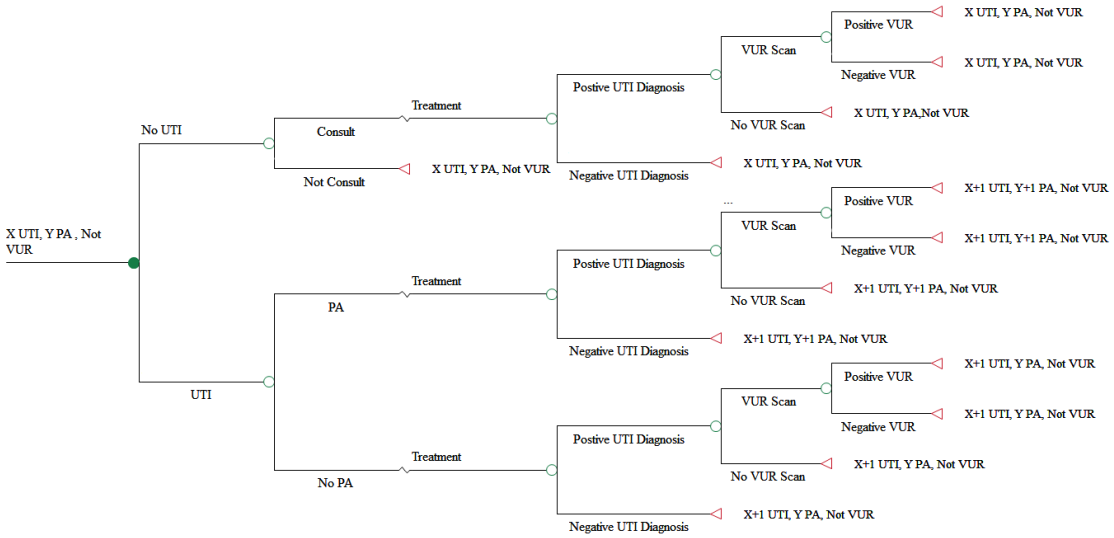
[f] This is a simplification of the actual model which included separate states depending on how quickly the child received an antibiotic (delayed vs. immediate) and if the uropathogen was sensitive to the prescribed treatment (sensitive vs. resistant)

Supplemental figure 2a: Medium-term model[g]

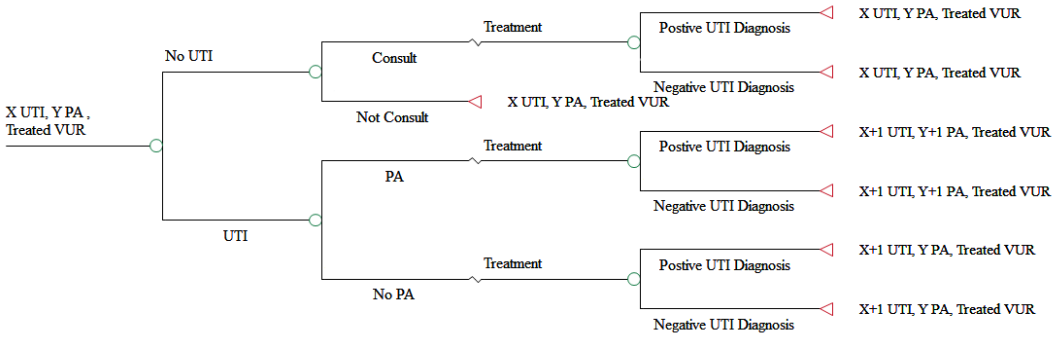


[g] UTI: urinary tract infection; PA: pyelonephritic attack. Figure represents the movement of patient within the medium term model in each year of the model. UTIs are more likely for patients with VUR although part of this increase is mitigated for patients with treated VUR. Patients may move between the untreated VUR and treated VUR if they receive a correct VUR diagnosis.

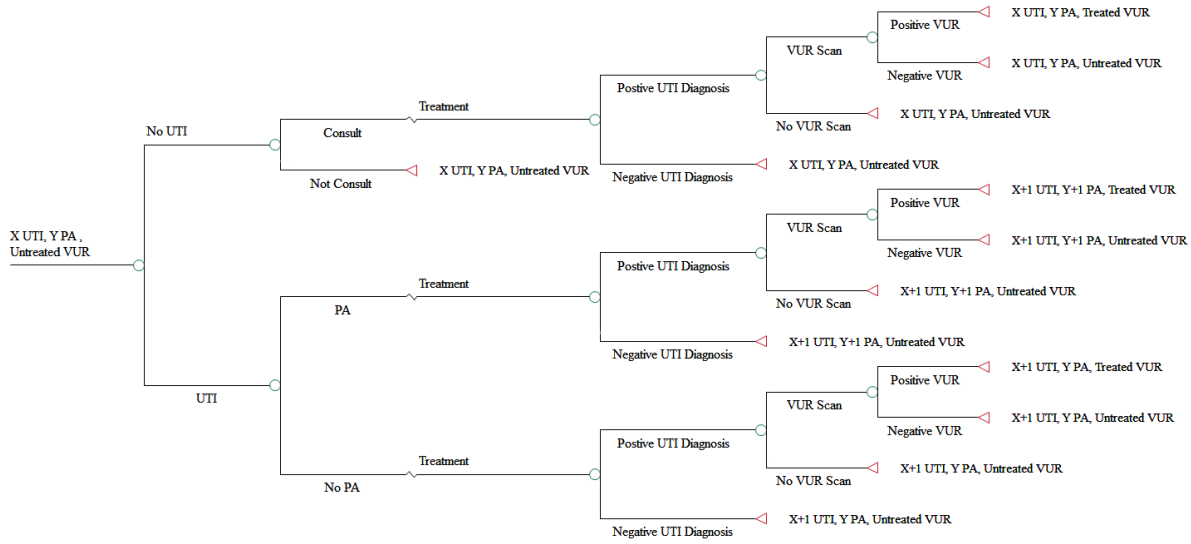
Supplemental figure 2b: Medium-term model, no VUR.[h]



Supplemental figure 2c: Medium-term model, treated VUR.

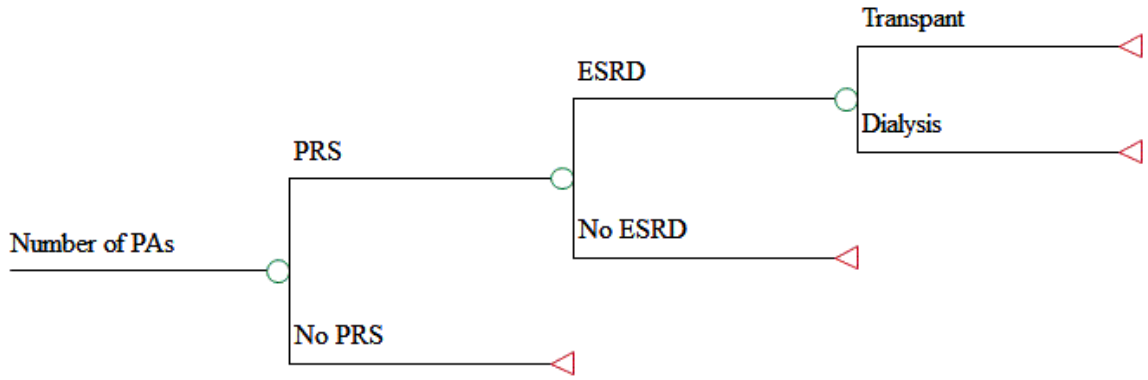


Supplemental figure 2d: Medium-term model, untreated VUR.



[h] UTI: urinary tract infection; PA: pyelonephritic attack; VUR: vesicoureteral reflux

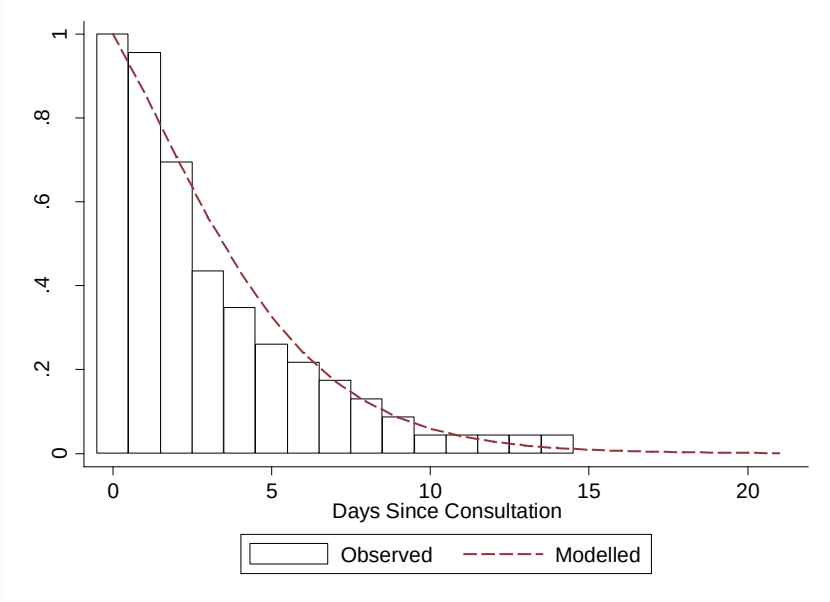
Supplemental figure 3: Long-term model[i]



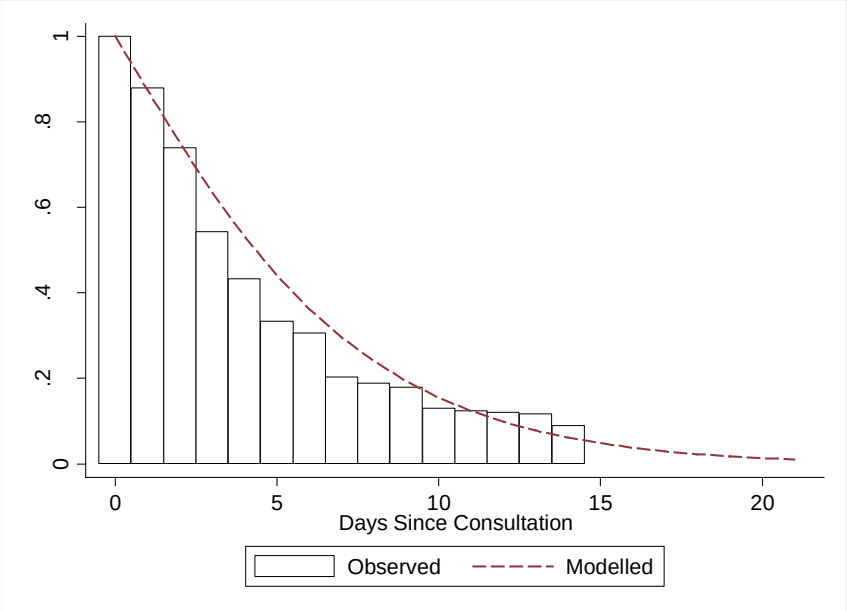
[i] PA: pyelonephritic attack; PRS: progressive renal scarring; ESRD: end-stage renal disease

Supplemental figure 4: Comparison of observed and modelled[j] symptom resolution for children a) with treated urinary tract infection (n=23) and b) without urinary tract infection (n=291)

a)



b)



[j] We used responses to the question 'How many days since [name of child] joined the DUTY study (day 0) was it until [his/her] symptoms improved?' in the 14 day questionnaire data to calculate symptom duration. A small proportion of parents of children both with and without UTI reported symptom recovery times greater than 14 days hence we extrapolated our estimates to 21 days by which time the vast majority of children were predicted to have become asymptomatic. We fitted Weibull models (shape = 1.487, scale = 0.096) for children with UTI and (shape = 1.270, scale = 0.1016) for those without.

Supplemental table 4: Cost and quality of life (utility) parameters[k]

Item	Estimate (£)[l]	Distribution	Source
Urine sample	7.03	Uniform(3.52,10.55)	DUTY
Urine sample & dipstick	8.10	Uniform(4.05,12.15)	DUTY
Sample attempted but not obtained	1.46	Uniform(0.73,2.19)	DUTY
Laboratory test	6.36	Uniform(3.18,9.54)	Carter Report[1]
Dipstick test kit	0.39	Uniform(0.2,0.59)	DUTY
GP test interpretation	2.42	Uniform(1.21,3.63)	Expert Opinion
GP call to parents	16.08	Uniform(8.04,24.12)	Expert Opinion
Trimethoprim	2.91	Uniform(1.45,4.36)	PCA[2]
Amoxicillin	1.29	Uniform(0.64,1.93)	PCA[2]
Ultrasound	51.88	Uniform(25.94,77.81)	NRC[3]
MCUG	142.20	Uniform(71.1,213.3)	Whiting[4]
UTI cost (2 days)	33.73	Uniform(16.86,50.59)	DUTY
UTI daily cost	11.49	Uniform(5.74,17.23)	DUTY
UTI & PA cost (2 days)	50.60	Uniform(15.92,47.76)	DUTY & Expert Opinion
UTI & PA daily cost	17.23	Uniform(8.62,25.85)	DUTY & Expert Opinion
Non UTI cost (2 days)	24.68	Uniform(12.34,37.02)	DUTY
Non UTI daily cost	5.49	Uniform(2.74,8.23)	DUTY
Antibiotic Prophylaxis	24.69	Uniform(12.35,37.04)	Nagler[5], PCA[2]
Dialysis per year	22,467	Uniform(11233.53,33700.59)	Baboolal[6]
Transplant[m]	20,186	Uniform(10093,30278)	NRC[3]
Utilities			
Well Child	1.000	Uniform(0.80,1.00)	Assumption
UTI/ No PA	0.943	Uniform(0.75,1.00)	Brisson[7]
UTI/ PA	0.711	Uniform(0.57,0.85)	Whiting[4]
Non UTI Illness	0.943	Uniform(0.75,1.00)	Brisson[7]
No ESRD (Well Adult)	1.000	Fixed	NA
Dialysis	0.430	Uniform(0.34,0.52)	Churchill[8]
Transplant	0.840	Uniform(0.67,1.00)	Churchill[8]

[k] GP: general practitioner; MCUG: micturating cystourethrogram; UTI: urinary tract infection; PA: pyelonephritic attack; ESRD: end-stage renal disease

[l] All costs were modelled as uniform distributions with lower and upper bounds -/+50% of the mean. All utilities were modelled as uniform distributions with lower and upper bounds -/+20% of the mean.

[m] Assuming healthcare resource group LA02A.

Supplemental table 5: Comparison of mean TAPQOL domain scores by GP Diagnosis[n]

Domain	UTI (N=58)	URTI (N=229)	Viral Illness (N=109)	Otitis Media (N=66)	Chest Infection (N=46)	Tonsillitis (N=29)	Gastroenteritis (N=26)	Other (N=112)
Sleeping	0.598	0.569	0.592	0.538	0.511	0.504	0.603	0.611
Appetite	0.603	0.654	0.667	0.667	0.607	0.526	0.564	0.683
Lungs	0.954	0.912	0.939	0.962	0.79	0.848	0.978	0.921
Stomach	0.803	0.870	0.818	0.889	0.855	0.802	0.638	0.804
Skin	0.909	0.875	0.896	0.876	0.909	0.888	0.933	0.878
Motor	0.948	0.939	0.952	0.950	0.924	0.881	0.910	0.942
Social	0.841	0.799	0.817	0.795	0.819	0.795	0.796	0.795
Problem	0.741	0.689	0.706	0.697	0.685	0.653	0.676	0.698
Communication	0.949	0.944	0.971	0.909	0.952	0.847	0.958	0.933
Anxiety	0.845	0.877	0.867	0.889	0.830	0.902	0.859	0.823
Positive	0.739	0.750	0.752	0.750	0.685	0.707	0.699	0.733
Liveliness	0.615	0.702	0.734	0.727	0.645	0.701	0.590	0.687

[n] UTI: urinary tract infection; URTI: upper respiratory tract infection. Diseases are based on the working diagnosis of the consulting GP except for UTI where only those with laboratory confirmed UTI are included

Supplemental table 6: Sensitivity analysis, short-term costs and outcomes[o]

	UTI Prevalence		Lab Diagnostic Accuracy		ABX Treatment Effect		UTI Utility		Simple	
	CJ	DUTY5%	CJ	DUTY5%	CJ	DUTY5%	CJ	DUTY5%	CJ	DUTY5%
Diagnostic pathway										
Urine sample requested (%)	12.64	8.80	9.12	4.79	9.12	4.79	9.12	4.79	9.12	4.79
Sensitivity – urine sampling	0.564	0.582	0.564	0.582	0.564	0.582	0.564	0.582	0.564	0.582
Specificity – urine sampling	0.915	0.962	0.915	0.962	0.915	0.962	0.915	0.962	0.915	0.962
Sensitivity – after laboratory test	0.426	0.439	0.539	0.557	0.426	0.439	0.426	0.439	0.426	0.439
Specificity – after laboratory test	0.998	0.999	1.000	1.000	0.998	0.999	0.998	0.999	0.998	0.999
Treatment pathway (children with UTI)										
Immediate, appropriate[p] antibiotic (%)	36.64	34.05	37.06	34.42	36.64	34.05	36.64	34.05	36.64	34.05
Laboratory informed[q], appropriate antibiotic (%)	12.51	16.55	15.21	20.14	12.51	16.55	12.51	16.55	12.51	16.55
Inappropriate antibiotic (%)	17.56	16.50	16.65	15.46	17.56	16.50	17.56	16.50	17.56	16.50
No antibiotic (%)	33.29	32.90	31.09	29.97	33.29	32.90	33.29	32.90	33.29	32.90
Treatment pathway (children without UTI)										
Antibiotic treatment for UTI (%)	4.79	1.62	4.71	1.57	4.79	1.62	4.79	1.62	4.786	1.616
Short term costs and outcomes										
Costs per child										
Sampling, culture, antibiotic treatment costs	2.74	2.04	2.00	1.22	1.99	1.22	1.99	1.22	1.99	1.22
Initial (21 day) health service costs	46.65	45.95	44.05	43.27	43.99	43.21	44.06	43.28	43.94	43.17
Outcomes										
Asymptomatic days	16.40	16.40	16.35	16.35	16.35	16.35	16.34	16.34	16.34	16.34
Short term average QALDs[r]	20.72	20.72	20.73	20.73	20.73	20.73	20.73	20.73	20.73	20.73
Cost-effectiveness										
iNMB[s] per child	---	0.70	---	0.77	---	0.78	---	0.78	---	0.78

[o] CJ: clinical judgement; UTI: urinary tract infection; QALDs: quality-adjusted life days; iNMB: incremental net monetary benefit

[p] (In)appropriate defined as an antibiotic to which the bacterium is (not) sensitive.

[q] Antibiotic prescribing determined by laboratory result, usually started a few days after primary care attendance.

[s] Based on a £20,000 per QALY threshold; compared to clinical judgement; a positive value indicates that the strategy is more cost-effective than clinical judgement

Supplemental table 7: Sensitivity analysis, medium and long-term costs and outcomes[t]

	ESRD Probability		PRS Probability	
	CJ	DUTY5%	CJ	DUTY5%
Average number UTI recurrence at 3 years / 10,000 patients	165.5	165.5	165.5	165.5
% End Stage Renal Disease	0.477	0.477	0.501	0.501
Average years lived	72.84	72.84	72.83	72.83
Average Lifetime Cost	303.1	300.7	315.8	313.5
Average Lifetime QALYs	25.66	25.66	25.65	25.65
iNMB[u], per child	---	2.28	---	2.28

[t] CJ: clinical judgement; UTI: urinary tract infection; ESRD: end-stage renal disease; QALYs: quality-adjusted life years; iNMB: Incremental net monetary benefit

[u] Based on a £20,000 per QALY threshold; compared to clinical judgement strategy; a positive value indicates that the strategy is more cost-effective than clinical judgement

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