Preliminary microbiological characterization of urines from young children submitted as part of the DUTY study

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Introduction

Diagnosis of UTI in children in primary care is difficult and may be missed in as many as 50% of children. The DUTY study (Diagnosing Urinary Tract infection in Young children) aims to derive and validate a cost effective algorithm for the diagnosis of UTI in children <5 years presenting to primary care with an acute illness. To achieve this 7374 children presenting with an acute illness were recruited at 233 sites across the UK. We present a preliminary analysis of the urinary microbiology from these patients.

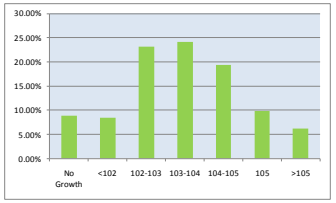
Methods

Urines were collected where possible from children <5 years presenting to primary care with an acute illness and sent in boric acid to the central laboratory. Here 50 µL urine was inoculated onto UTI Chromogenic agar (Oxoid), and Blood agar using a spiral plater. After incubation for 18-24 hours, absolute colony counts of each colonial type were measured, and colonies picked for further identification and susceptibility testing using the BSAC disc method.

Table 1. Growth quantities in all organisms.

	Quantity of growth						
	No growth	$<10^2$	10^2-10^3	10^3-10^4	10^4-10^5	10^5	$>10^5$
No of urines	452 (8.8%)	433 (8.5%)	1184 (23.2%)	1230 (24.1%)	991 (19.4%)	500 (9.8%)	317 (6.2%)

Figure1. Percentage of total growth in all urines



Results

From the 7163 patients enrolled, 5107 urines were tested at the Central laboratory, of which 4222 (82.7%) grew at least 10^2 cfu/mL of 1 or more organisms. Most urines contained 1 or 2 organisms but some had 6 organisms present Table 2).

Table 2. Urines containing 1 or more organisms.

	Number of urines					
	1	2	3	4	5	6
No of organisms present	4653	3250	212	15	2	20

Results cont.

Laboratory cut offs for urinary tract infection (UTI) vary, ranging from 10^2 in symptomatic patients to $\geq 10^5$ cfu/mL. Quantities of total growth in the 5107 urines are shown in table/figure 1. Of the 8152 organisms 7350 were identified, with the commonest organisms: Enterococci (ECC) – 51.1%, *E. coli* (ECO) – 27.4%, coagulase negative staphylococci (CNS) – 44.2%, other Enterobacteriaceae – 11%. All CNS were novobiocin sensitive (ie not *S. saprophyticus*). 138 urines (2.7%) grew $>10^5$cfu/mL of a pure or predominant growth. In this group, the commonest organisms were ECO – 49.3%, CNS – 24.6%, Enterococci - 11.6%, *Klebsiella/Enterobacter/Serratia* (KES) – 5.8%, and *Proteus spp*. (PRO) – 4.4%. Antibiotic resistance rates for these organisms are shown in Table 2.

Table 2. Percentage resistance of organisms in pure/predominant growth $>10^5$cfu/mL.

	ECO (79)	ECC (35)	KES (8)	PRO (6)
AMO	63.2	-	100	0
COA	29.4	-	37.5	0
CFX	10.3	-	25	0
CPD	1.5	-	0	0
CIP	7.4	-	0	0
NIT	0	0	25	100
TMP	32.4	-	12.5	16.7
VAN	-	0	-	-

Conclusions

Bacterial growth was seen in over 80% of urines tested while 2.7% of urines yielded a growth of $>10^5$cfu/mL of a pure or predominant organism. ECO was the commonest organism found in pure predominant growth, but other organisms such as CNS, not usually categorized as uropathogens, were also seen in more than 20% of $>10^5$cfu/mL pure/predominant growths. It is hoped that analysis of the clinical characteristics of the patients collected in the DUTY study will enable a better categorization of organisms into uropathogens/non-uropathogens to facilitate more useful interpretation of urine samples for this age group.
Resistance rates for ECO in this unselected population were high for commonly used agents and are a concern for the development of empiric treatment regimes.

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