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Epidemiology Newsletter

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Antibiogram of Organisms Commonly Isolated from Outpatient Urinary Tract Specimens in Clark County, Nevada – January 2004 through March 2006

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Introduction

The increasing occurrence of antibiotic resistance (AR) has become an urgent public health problem. Although it has long been common in nosocomial infections, it is seen with increasing frequency in infections with no healthcare association. In an effort to understand this issue more clearly, the Southern Nevada Health District (SNHD) has been working with Quest Laboratories to examine the local occurrence of antibiotic resistance. This report will focus on the most common bacterial organisms causing outpatient urinary tract infections (UTI) in Clark County.

Methods

SNHD electronically receives culture and sensitivity results for all bacterial isolates processed by Quest laboratories in Clark County. This information is transmitted on a monthly basis. It includes the name of the organism isolated, its antibiotic sensitivity, patient identification information, requesting facility/physician and specimen source. Software programming and manual sorting through organism descriptions to assign consistent names were necessary to extract organisms associated with urinary tract infections from the Quest data. Organism names are not uniformly entered at the laboratory and as such the same organism may have as many as twenty or more descriptions. Therefore, preexisting knowledge of organisms most frequently associated with UTIs was applied and a broad spectrum of organisms was predefined so that AR data associated with those selected organisms could be filtered out from the rest of Quest data. This was done using keywords "urine" or "urethra" as filtering criteria in the source of culture or test name fields.

A computer program was also written to remove duplicates. When a patient had more than one isolate of the same organism within a 30 day period it was removed. To determine outpatient data, facilities in Clark County such as general medical-surgical hospitals, rehabilitation and specialty hospitals, nursing homes and hospices were removed. In addition, only those bacterial species isolated ≥ 500 times since January 2004 were included in the analysis. Since *Serratia* spp. were isolated only 96 times, they will not be included in this report.

Results

Numerous bacterial species were isolated from urine and urethra sources. Some of these likely represent contaminants. The most common organism reported is *Escherichia coli* followed by *Klebsiella pneumoniae*, *Enterococcus* spp., *Proteus mirabilis*, Coagulase negative *Staphylococcus* spp., *Pseudomonas aeruginosa*, and *Staphylococcus aureus*. Box 1 illustrates the number of isolates identified by their degree of susceptibility to various antibiotics in quarter 1 of 2006 for the three most frequently isolated organisms. The percent susceptibilities are indicated within the bar charts for each organism. Table 1 lists the number of isolates tested for each bacterial species isolated ≥ 500 times from 1/1/2004 to 3/31/2006 and their percent susceptibilities. It is important to note that not every isolate is tested for sensitivity to every antibiotic in the tables.

Discussion

These data include the best approximation of local outpatient urine culture results. In some instances, the raw data might not indicate the specimen source or there is inconsistency in naming the source and thus may have been excluded. Additionally, data may include outpatients that are catherized. Locally, *E. coli* is isolated from the urinary tract more than seven times greater than all other organisms in this report.

Antimicrobials commonly recommended for empiric treatment of uncomplicated urinary tract infections (uUTIs) include but are not limited to trimethoprim-sulfamethoxazole (TMP-SMX), ciprofloxacin or fluoroquinolones, nitrofurantoin, fosfomycin, cephalexin or other cephalosporins, amoxicillin, and amoxicillin-clavulanic acid (1, 2, 3). If community resistance to TMP-SMX is ≥20% or the patient has a history of

allergy to the drug, it is necessary to replace this inexpensive and effective drug with one of the alternatives (3). Urinary tract isolates of *E. coli* in our community show greater than 20% resistance to TMP-SMX. Several antimicrobials to which this organism is greater than 90% susceptible are recommended when empiric treatment is chosen. Although fluoroquinolones are very effective and have an important role in treating uncomplicated cystitis, rising fluoroquinolone resistance is a serious public health threat and routine use for initial therapy is discouraged (3,4,5).

Some experts suggest that routine urine cultures are not necessary for UTIs because of the predictable nature of the causative organism (3). Others counter that pre-therapy cultures are important especially from a public health viewpoint because this information both confirms the diagnosis and reveals the antibiotic susceptibility patterns in the community (4). In an age where bacteria are becoming more resistant and antibiotic treatment alternatives are becoming less abundant and more expensive, the clinician should consider obtaining a urine culture and sensitivity to ascertain the most appropriate first line antibiotic for treatment.

Ideally, a specimen would be collected for culture and the patient could be placed on the most appropriate empiric choice antibiotic while awaiting culture results. Since it would be difficult to assume that the UTI was caused by another organism, without culture evidence, choosing an antibiotic that would be effective against the most likely organisms may be a viable treatment option, with any later modification in therapy based on subsequent culture results. When prescribing antibiotics clinicians should always speak with the patients about the use and non-use of antibiotics, the rationale for taking them and the importance of adhering to the instructions.

References

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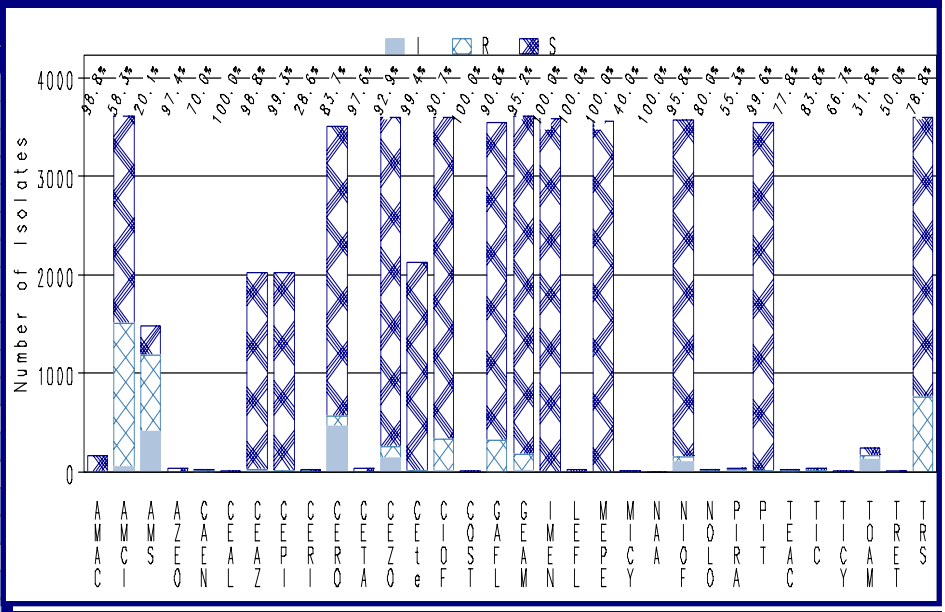
Box 1. Number of Isolates Tested by AR Result (Qtr1, 2006)

	Enterococcus spp.				Escherichia coli				Klebsiella pneumoniae			
	I	R	S	All	I	R	S	All	I	R	S	All
AMAC	0	0	0	0	1	1	168	170	2	7	27	36
AMCI	0	25	358	383	49	1459	2104	3612	0	509	1	510
AMS	0	0	0	0	412	773	298	1483	26	64	416	506
AZEO	0	0	0	0	0	1	37	38	0	0	8	8
CAEN	0	0	0	0	1	5	14	20	0	1	0	1
CEZO	0	0	0	0	140	117	3343	3600	4	44	462	510
CEPI	0	0	0	0	0	14	2003	2017	0	25	286	311
CETA	0	4	0	4	0	1	40	41	0	0	7	7
CEAZ	0	0	0	0	8	17	1992	2017	0	24	287	311
CERI	0	5	0	5	0	15	6	21	0	24	7	31
CERO	0	0	0	0	459	111	2934	3504	23	49	434	506
CEAL	0	0	0	0	0	0	5	5	0	0	1	1
CHRA	0	0	1	1	0	0	0	0	0	0	0	0
CIOF	2	19	70	91	4	331	3258	3593	5	43	463	511
CLDA	0	19	0	19	0	0	0	0	0	0	0	0
COST	0	0	0	0	0	0	5	5	0	0	8	8
CEte	0	0	0	0	6	6	2109	2121	0	1	495	496
ERHR	5	9	6	20	0	0	0	0	0	0	0	0
GAFL	0	17	67	84	2	322	3215	3539	6	44	451	501
GEAM	0	0	0	0	7	167	3438	3612	9	19	483	511
GE_	0	0	2	2	0	0	0	0	0	0	0	0
IMEN	0	0	0	0	0	1	3584	3585	0	0	509	509
LEFL	1	102	272	375	0	0	18	18	0	1	6	7
LIZO	0	0	64	64	0	0	0	0	0	0	0	0
MEPE	0	0	0	0	0	1	3556	3557	0	0	504	504
MICY	0	0	0	0	1	2	2	5	2	6	0	8
MOFL	0	0	0	0	0	0	0	0	0	1	1	2
NAA	0	0	0	0	0	0	1	1	0	0	0	0
NIOF	6	15	359	380	99	52	3420	3571	253	158	93	504
NOLO	0	0	0	0	0	4	16	20	0	0	1	1
PEG	0	3	12	15	0	0	0	0	0	0	0	0
PIRA	0	0	0	0	3	14	21	38	2	0	5	7
PIT	0	0	0	0	13	2	3530	3545	2	16	491	509
QUD	2	21	14	37	0	0	0	0	0	0	0	0
SYRC	0	2	4	6	0	0	0	0	0	0	0	0
TEAC	0	15	10	25	1	5	21	27	0	0	1	1
TIC	0	0	0	0	5	1	31	37	0	0	6	6
TICY	0	0	0	0	0	1	2	3	0	0	8	8
TOAM	0	0	0	0	123	40	76	239	5	33	472	510
TRET	0	2	2	4	0	2	2	4	0	0	0	0
TRS	0	0	0	0	0	760	2830	3590	0	51	459	510
VAOM	0	16	366	382	0	0	0	0	0	0	0	0

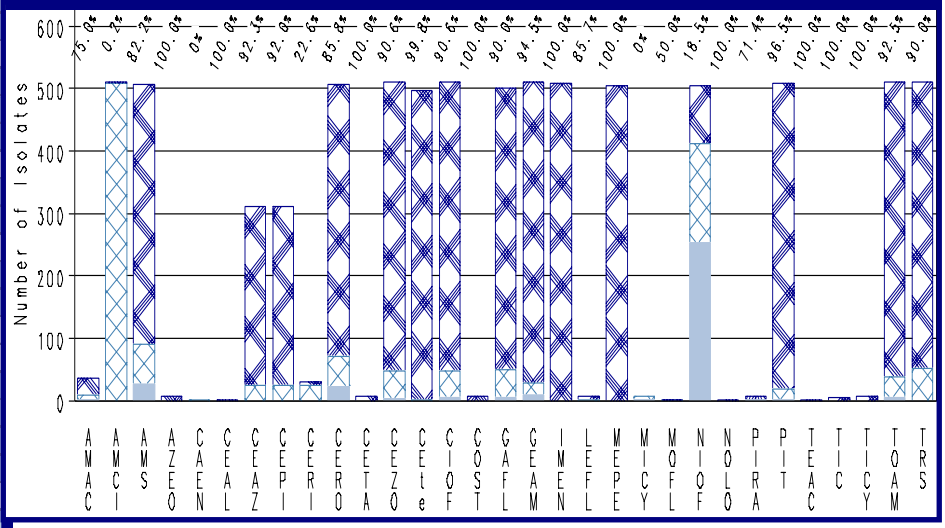
See below for antibiotic codes. %susceptible noted on charts.

Antibiotic codes: AMAC:amikacin AMCI:ampicillin
AMS:ampicillin_sulbactam AZEO:aztreonam
CAEN:carbenicillin CEAL:cephalothin
CEAZ:ceftazidime CEPI:cefepime CERI:ceftriaxone
CERO:cefuroxime CETA:cefotaxime CEte:cefotetan
CEZO:cefazolin CHRA:chloramphenicol
CIOF:ciprofloxacin CLDA:clindamycin
COST:colistin ERHR:erythromycin
GAFL:gatifloxacin GEAM:gentamicin
GE_:gent__synergy IMEN:imipenem
LEFL:levofloxacin LIZO:linezolid MEPE:meropenem
MICY:minocycline MOFL:moxifloxacin
NAA:naladixic_acid NIOF:nitrofurantoin
NOLO:norfloxacin PEG:penicillin_g
PIRA:piperacillin PIT:piperacillin_tazobactam
QUD:quinupristin_dalfopristin SYRC:synercid
TEAC:tetracycline TIC:ticarcillin_clavulanic_acid
TICY:tigecycline TOAM:tobramycin
TRET:trimethoprim
TRS:trimethoprim_sulfamethoxazole
VAOM:vancomycin

Escherichia coli: Susceptibility data reported in Qtr1, 2006



Klebsiella pneumoniae: Susceptibility data reported in Qtr1, 2006



Enterococcus spp.: Susceptibility data reported in Qtr1, 2006

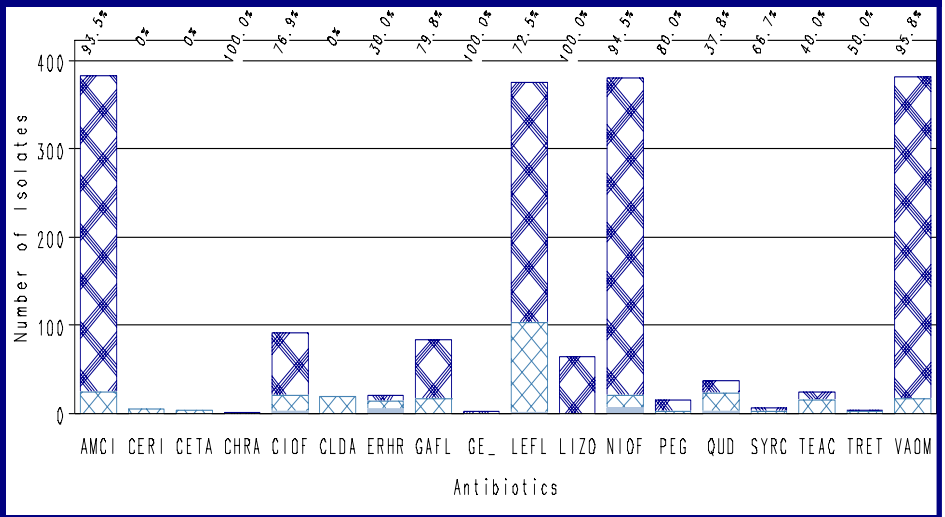


Table 1. Antimicrobial Susceptibility Data of Urinary Tract Isolates (outpatient)

Number of Isolates Tested and Susceptible Percentages of Selected Organisms(01JAN2004 to 31MAR2006)

	Enterobacter aerogenes		Enterobacter cloacae		Enterococcus spp.		Escherichia coli		Klebsiella pneumoniae		Proteus mirabilis		Pseudomonas aeruginosa		Staph.spp. Coag.neg		Staphylococcus aureus	
	N	S.%	N	S.%	N	S.%	N	S.%	N	S.%	N	S.%	N	S.%	N	S.%	N	S.%
Num. Isolates Tested	507		561		3108		32352		4484		1717		984		1500		884	
AMIKACIN	10	90%	45	87%	0		1238	99%	208	73%	133	100%	296	94%	0		0	
AMOXICILLIN/CLAVULANIC ACID	25	8%	41	0%	0		1448	85%	313	92%	103	96%	1	0%	9	44%	18	83%
AMPICILLIN	254	1%	278	3%	3103	94%	32314	61%	4456	0%	1713	87%	31	87%	12	17%	20	20%
AMPICILLIN/SULBACTAM	67	1%	11	73%	0		2654	23%	956	84%	46	59%	32	97%	226	98%	96	97%
AZTREONAM	4	100%	16	75%	0		144	94%	42	79%	13	92%	224	82%	0		0	
CARBENICILLIN	28	96%	44	70%	0		1567	62%	325	0%	114	86%	1	100%	0		0	
CEFAZOLIN	505	2%	550	2%	0		31017	93%	4377	93%	1692	97%	22	0%	587	98%	308	99%
CEFEPIME	259	100%	444	98%	0		15433	99%	1977	95%	739	100%	789	92%	0		0	
CEFOPERAZONE	0		0		0		1	100%	0		0		0		0		0	
CEFOTAXIME	5	80%	25	80%	10	20%	179	99%	41	90%	13	100%	35	26%	1	0%	0	
CEFTAZIDIME	463	95%	483	86%	0		15447	99%	1968	96%	742	99%	832	87%	0		0	
CEFTRIAXONE	8	38%	64	30%	13	23%	202	50%	121	31%	21	81%	452	3%	7	43%	3	67%
CEFUROXIME	492	87%	528	23%	0		31600	86%	4423	89%	1694	96%	7	0%	0		0	
CEPHALOTHIN	25	16%	44	0%	0		1455	85%	322	88%	106	90%	0		7	43%	3	67%
CHLORAMPHENICOL	0		0		24	92%	0		0		0		2	0%	1	100%	4	75%
CIPROFLOXACIN	143	99%	182	95%	1200	72%	8269	91%	1308	92%	505	90%	391	75%	310	52%	183	45%
CLINDAMYCIN	0		0		30	13%	0		0		0		0		616	87%	336	91%
COLISTIN	0		1	100%	0		6	100%	13	92%	0		9	100%	0		0	
Cefotetan	467	1%	499	8%	0		16450	99%	4085	100%	770	100%	27	78%	0		0	
ERYTHROMYCIN	0		0		60	37%	0		0		0		0		633	56%	338	67%
GATIFLOXACIN	103	100%	113	97%	321	69%	6386	91%	921	92%	366	90%	209	74%	100	57%	60	32%
GENTAMICIN	507	99%	560	95%	0		32338	96%	4482	96%	1716	92%	981	86%	485	94%	305	99%
GENTAMICIN 500MCG/ML	0		0		1	100%	0		0		0		0		0		0	
Gent_Synergy	0		0		2	100%	0		0		0		0		0		0	
IMIPENEM	472	100%	505	100%	0		30570	100%	4141	100%	531	88%	959	86%	8	38%	4	50%
LEVOFLOXACIN	401	97%	439	93%	3070	72%	25612	93%	3540	94%	1279	91%	593	72%	1496	47%	871	32%
LINEZOLID	0		0		353	98%	0		0		0		0		163	100%	559	100%
MEROPENEM	467	100%	491	100%	0		30455	100%	4110	100%	1548	100%	765	91%	0		0	
MEZLOCILLIN	0		1	0%	0		10	30%	1	0%	0		143	74%	0		0	
MINOCYCLINE	26	88%	44	50%	0		1444	83%	323	84%	101	1%	18	17%	0		0	
MOXIFLOXACIN	1	100%	2	100%	0		2	50%	3	67%	0		0		100	58%	50	30%
NALADIXIC/ACID	25	96%	42	90%	0		1422	90%	311	85%	101	79%	0		0		0	
NITROFURANTOIN	498	14%	542	42%	3039	94%	32112	97%	4444	24%	1688	0%	569	0%	1189	99%	764	99%
NORFLOXACIN	28	96%	50	96%	0		1586	91%	329	91%	114	87%	1	100%	28	39%	21	33%
OFLOXACIN	0		0		9	78%	0		0		0		0		9	67%	9	78%
OXACILLIN	0		0		0		0		0		0		0		1495	42%	882	40%
PENICILLIN G	0		0		174	90%	0		0		0		0		619	9%	376	7%
PIPERACILLIN	373	92%	392	80%	0		24161	72%	3122	1%	1230	94%	728	94%	0		0	
PIPERACILLIN/TAZOBACTAM	4	100%	17	88%	0		30555	99%	4144	96%	1595	99%	756	97%	3	100%	2	100%
QUINUPRISTIN/DALFOPRISTIN	0		0		174	39%	0		0		0		0		52	98%	19	100%
RIFAMPIN	0		0		0		0		0		0		0		1035	98%	658	98%
SYNERCID	0		0		89	90%	0		0		0		0		5	100%	1	100%
TETRACYCLINE	3	67%	7	100%	60	35%	155	74%	17	71%	13	0%	0		185	92%	348	96%
TICARCILLIN	1	100%	1	0%	0		10	20%	1	0%	1	100%	145	81%	0		0	
TICARCILLIN/CLAVULANIC ACID	3	67%	14	79%	0		91	88%	22	100%	9	100%	21	90%	0		0	
TIGECYCLINE	0		1	100%	0		4	75%	9	100%	0		0		0		0	
TOBRAMYCIN	507	99%	560	95%	0		1947	37%	4179	94%	281	52%	951	91%	0		0	
TRIMETHOPRIM	0		2	100%	4	50%	14	50%	2	100%	1	100%	4	0%	1	0%	0	
TRIMETHOPRIM/SULFAMETHOXAZOLE	506	98%	560	85%	1	0%	32122	79%	4474	90%	1641	88%	11	64%	1453	69%	875	97%
VANCOMYCIN	0		0		3101	94%	0		0		0		0		1245	100%	701	100%