



MVZ DORTMUND - Dr.Eberhard u. Partner - MICROBIOLOGY
diagnostics and service - an overview
introducing the microbiology-unit in Dortmund

MIKROBIOLOGIE www.labmed.de / mikro@labmed.de



Mongolia September 2012

accreditation since april 2003 (DIN EN ISO 15189; DACH)

MVZ Dortmund - Dr.Eberhard u. Partner





Dortmund, "Ruhr-valley" - Germany



foundet in 890 as "imperial free city" (part of an important trading route)

1900 - 1970 well known for beer (7 Breweries), coal-mines, steel-production (Thyssen, Hoesch)
and now: 600.000 citizens, technical university, research, administration, soccer-champion 2012

"Labor Dr.Eberhard" was founded in the seventies with 25 employees

and now "MVZ Dortmund / Dr.Eberhard" provides medical diagnostics with 350 employees!



MICROBIOLOGY - diagnostics and service

- **medical director (microbiology-unit):**

Felix Pranada

(microbiology - epidemiology of infection)



- **additional doctors:**

Dr. **Arthur Pranada**

Dr. **Anja Saegers**

Dr. **Csilla Rompf**

and: 2 scientists /biologists
 ≈ 25 technicians (MTLA / BTA)
 ≈ 4 trainees (MTLA-school Dortmund etc.)





- **organisation / management: microbiology-unit:**

- **evaluating about 500-900 specimen a day**
(from hospitals / physicians / medical centers)
- **turn-around-time: \approx 2 days**
(including resistance-determination; rapid-tests: same day possible)
- **all pathogenic bacteria - including Mycobacterium tuberculosis**
(laboratory: safety-classification 3; resistance: National Lab.Center)

- **laboratories of the microbiology-unit (\approx 600 sqm):**

- **varia-laboratory** (various specimen: swabs, urine etc.)
- **primary-sterile-laboratory** (blood, liquor cer., punctations etc.)
- **anaerobic bacteria- / yeast-laboratory**
- **stool-diagnostics / parasites** (gastro-intestinal, blood...)
- **respiratory-tract- and tuberculosis-laboratory**
- **laboratory for hygienic specimen: environment / equipment**
(control of sterilisator-function, endoscopic reprocessing, etc)



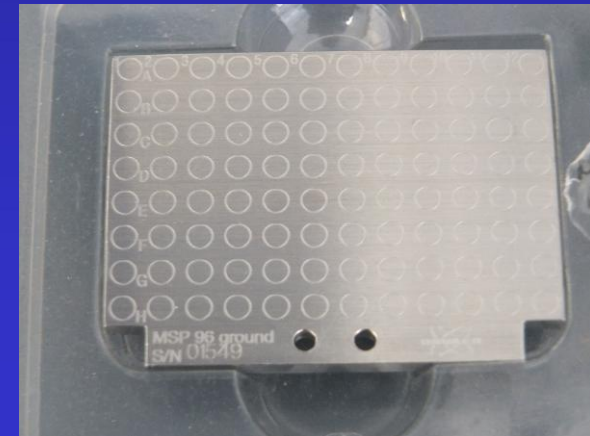
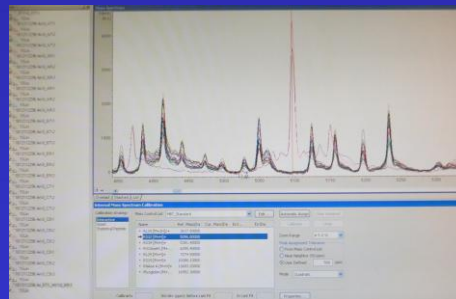
impressions:

... routine: varia, stool-diagnostics ...





... automated plate-streaking (Innova) ... and mass-spectrometry (MALDI-TOF)





... primary-sterile-laboratory (class 3), blood-culture-system (BACTEC 240/FX)



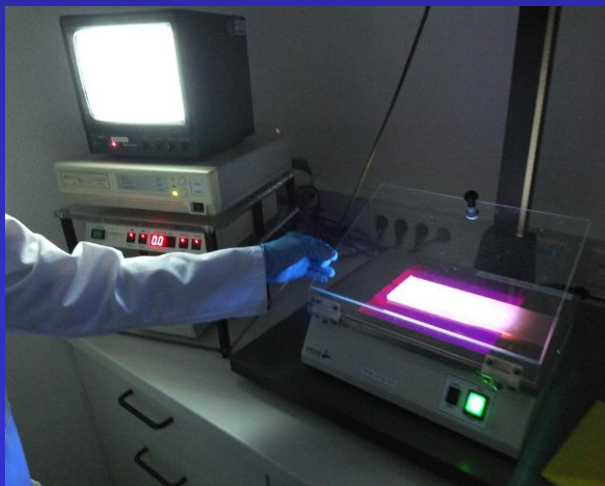


**... security lab (class 3):
diagnostics of
M. tuberculosis
... via BACTEC MGIT etc.**





... infections-PCR-laboratory, ... small picture - high costs for equipment ...





service of the microbiology-unit:

- **collection of specimen from hospitals 2 x / day**
(morning / afternoon; ... even possible on sunday)
- **working hours of laboratory (microbiology):**

mo-fr	07:00 - 19:00 h
sat	07:00 - 15:00 h
sun	08:30 - 13:30 h
- **24 hours-service for urgent diagnostic !**
(on-call-service ... e.g. ICU's)
- **doctors in laboratory: advising on medical matters by telephone**
(interpretation of relevant / komplex results
... on-site-visits possible too ... e.g. ICU's)
- **cooperation with executive personnel in hygiene (hospitals)**
- **presentations in hospitals**
(optimized collection of specimen, suited specimen, statistics
concerning the situation of antibiotic resistance, cost-controlling etc.)



provided security for best results - "highlights":

- cultural results by e.g. VITEK 2/XL-system
(automatisation of identification-/resistance-determination with modern methods - developed by the NASA)
identification > biochemical
resistance > minimal inhibitory concentration/ MIC
... results within 6-24 hours ...!

and: all results are proven by an "expert-program" !
(software checks hundreds of rules)

CAVE: oxacillin-test by Agar diffusion method is difficult (MRSA) !





... VITEK 2/XL-system is modern until now ...

... but we are always looking for better methods!



"egg-laying-wool-milk-pig"

**... in the future perhaps:
easy, reliable, sensitive, specific and inexpensive
detection-method for bacteria
...within 5 minutes...!?**

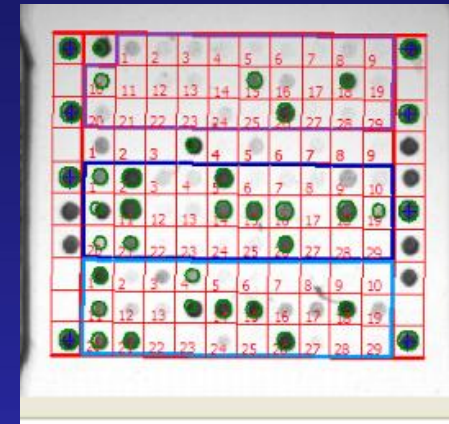


We know:

... **polymerase-chain-reaction / PCR:**
- MRSA and VRE etc.

... **DNA-Microarrays:**
- ESBL-detection

... and so on; but one method becomes a
"little revolution" in microbiology (2010):

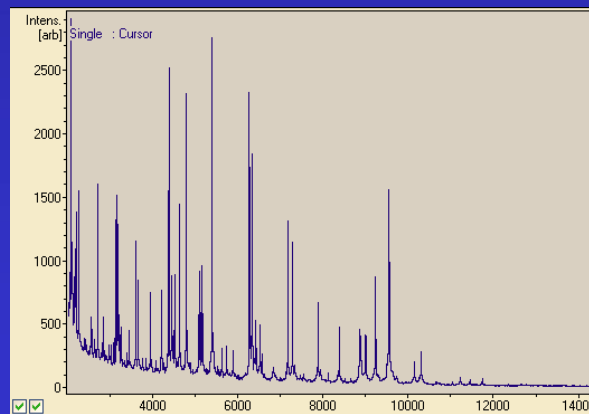
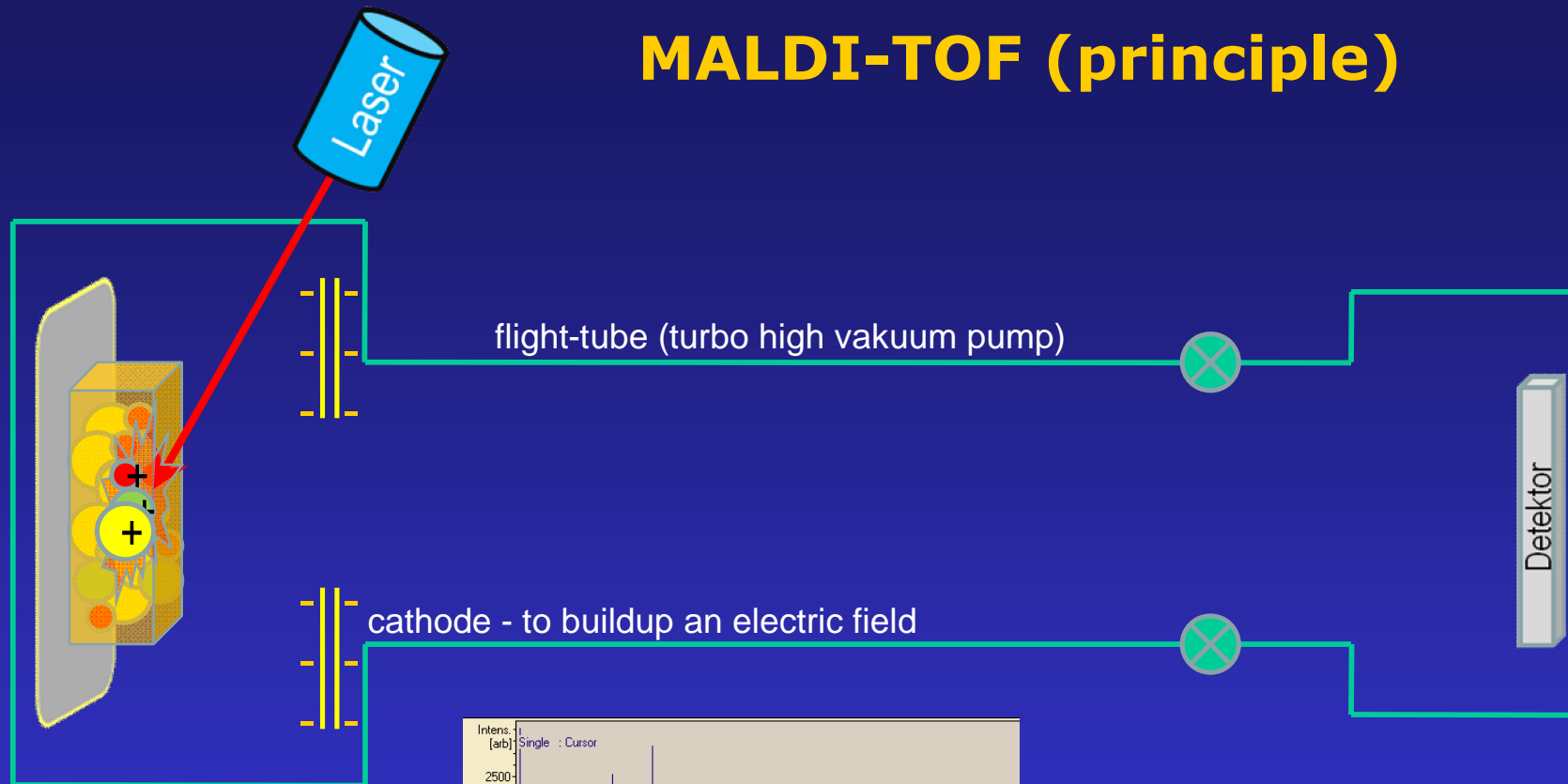


Matrix-Assisted Laser Desorption/Ionization- Time Of Flight (MALDI-TOF):

**fast identification of bacteria (within minutes!)
as an alternative to the
classic / biochemical methods (within hours/days)**



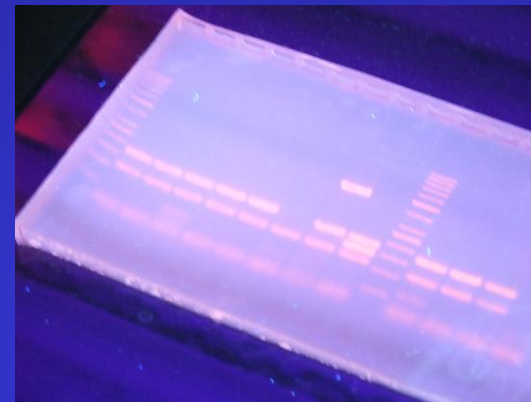
MALDI-TOF (principle)



specific spektrum of masses - compared to database ...



- **determination of toxine-producing E.coli (EHEC, ETEC) by PCR**
(StxI and StxII; Hlt and Hst; ... EIA suboptimal!)
- **Clostridium-difficile-toxine (A/B) by PCR**
(1. gene-product: toxine A/B; 2. mutation in regulatory-gene
> exclusion of high-virulent ribotypes ... O27 etc.)
- **meningococcal-infection-rapid-test for liquor by real-time-PCR**
(even saturday and sunday)
... detection and serotyping within 4-5 hours ...!
- **bacteria-detection in endoprothetics / heart-valves etc.**
by amplification/sequencing





- **first detection of MRSA within a patient: always provided by PCR**
(looking for mecA-genes > healthcare-associated/ ha-MRSA
... and parallel via real time PCR!
 - genes for PVL > often community aquired/ ca-MRSA
 - genes for ST398 > mostly livestock associated/ la-MRSA)

- **MRSA-rapid-test for several klinical specimen by real time PCR**
(SCCmec-based inhouse-test: direct detection of MRSA from
nasopharynx, wounds etc.)
... 2 x / day; results within 4 hours ...!

Staphylococcus aureus: resistant [%] hospitals/ physicians: 01.01.2001 bis 31.12.2009

n = patients !

	2001				2002				2003				2004				2009			
	H	n	P	n	H	n	P	n	H	n	P	n	H	n	P	n	H	n	P	n
Penicillin	81	4217	77	2835	88	4131	79	2796	85	4175	83	2756	86	4751	87	3042	79	5866	73	3896
Oxacillin	6	4198	2	2791	10	4122	3	2733	14	4164	6	2736	16	4742	7	3030	30	5808	14	3996
Vancomycin/ Teicoplanin	0	1893			0	3890			0	4160			0	4746			0	5848		

2011 H: hospitals: 34 % MRSA (n=7340 ; 3150 MRSA-patients!)



- screening study 2009 in the Dortmund "MDR-network"
(all hospitals; cooperation with public health department Dortmund)

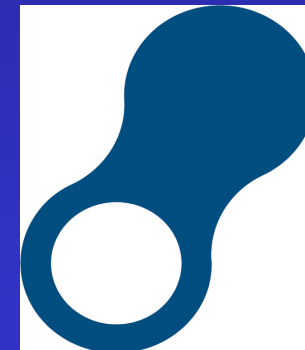
Projekt Dortmunder Krankenhäuser
koordiniert / moderiert durch das

Gesundheitsamt der Stadt Dortmund
53/3 Abt. für Umwelt- und Infektionshygiene



in Zusammenarbeit mit

MVZ Dortmund
Labor Dr.med. Eberhard & Partner
Abteilung MIKROBIOLOGIE





- diagnostic of M. tuberculosis:

- > microscopy: fluorescence and Ziehl-Neelsen-staining
- > kulture-medium and broth: BACTEC-MGIT

- identification of Mycobacteria:

- > mycobacterium-tuberculosis-complex/MTC via DNA-probe and PCR
- > atypical mycobacteria/MOTT (other-than-tuberculosis)

- resistance determination:

- > ... routine: for MTC

- direct detection from several specimen with PCR





• **HTML- results by "virtual-private-net"/ VPN:**

criteria: name,
date of birth
etc.

list of viewable
current results
concerning the
selected patient

The screenshot shows a web application interface for searching medical records. On the left, there is a list of patient names under the heading 'Patient-Nachname'. The list includes several entries, with the last one, '543456', highlighted in red. The main area of the page is a search criteria form titled 'Suchkriterien'. It contains several input fields: 'Nachname', 'Vorname', 'Geburtsdatum' (with separate boxes for day, month, and year), 'Labornummer', 'Fallnummer', 'Lebensnummer', and 'Auftragsnummer'. There are also date pickers for 'Logout nach:' (set to 10 Minuten) and 'Max. Treffer:' (set to 100). Below the search fields, there are two red buttons: 'Befundsuche starten' and 'Felder zuruecksetzen'. At the bottom of the form, there are more search options: 'Auftragsdatum' (set to 10/11/2004), 'Suchbereich' (set to -14 Tage), 'Einsender' (with a dropdown menu set to 'Alle'), and 'Befunde sortiert nach:' (set to 'Nachname'). A red button at the bottom left of the form says 'Einsender unbekannt'.



HTML-Befund - Microsoft Internet Explorer

Adresse: <http://htmlbef/loginresult.php?PHPSESSID=b7efa7604d6c2f6747dce6f609476f4c>

Laboratoriumsmedizin Dortmund
Dr. Eberhard & Partner

Laboratoriumsmedizin Dr. Eberhard & Partner | Postfach 10 10 40 44010 Dortmund | Balkenstr. 17 19 44137 Dortmund | Fnn: 0231 - 95 72-611 Fax: 0231 - 55 34 62 | mikrn@labmed.de www.labmed.de

Patient
002 0964 B, .

Thyssen Krupp Stahl AG
(570) Betriebsärztl.Dienst Dortmund

Eberhardstr. 12
44145 Dortmund

Tagesnummer	Geburtsdatum	Eingangsdatum
625832	31.07.1979	26.10.04
Ihr Zeichen		Ausgangsdatum
		28.10.04

Status: END-BEFUND | Blatt: 1

Mikrobiologischer Befundbericht

Abnahmedatum : o.Äng.
Klinische Angaben:

UNTERSUCHUNGSMATERIAL:
Stuhl

ANGEFORDERTE UNTERSUCHUNGEN:
Campylobacter
Salmonellen / Shigellen
Yersinien

selection and preview of the result

... fast communication of results for all senders !



• comments on important results:

... e.g. MRSA,
VRE, other
multi-drug-resistant
bacteria ...

Abnahmedatum: 28.12.11	
Klinische Angaben:	
UNTERSUCHUNGSMATERIAL:	
Abstrich Nasen-/Rachenraum	
ANGEFORDERTE UNTERSUCHUNGEN:	
MRSA - Screening	
R E S U L T A T E :	
NACHGEWIESENE KEIME:	
1. <i>Staphylococcus aureus</i>	
(mäßig viel)	
BEMERKUNG:	
C A V E ! MRSA: Methicillin/Oxacillin-resistenter <i>Staphylococcus aureus</i> !	
mecA-Gen [PCR]: POSITIV	
PVL-Gen (Marker-Gen für community acquired/CA-MRSA) [PCR]: negativ	
Sequenztyp ST398 (livestock-associated/LA-MRSA) [PCR]: negativ	
casus vorab telefonisch mitgeteilt	
HINWEIS zum Infektionsschutzgesetz:	
Folgende hier nachgewiesenen Keime sind aufgrund ihrer Resistenz in der Liste der gemäß §23 IfSG zu erfassenden Erreger aufgeführt:	
* <i>Staphylococcus aureus</i>	
	ANTIBIOGRAMME 1.
	Ampi-/Amoxicillin R
	Mezlocillin R
	Piperacillin R
	Penicillin G R
	Amoxicillin+Clavulans. R
	Ampicil.+Sulbactam R
	Piperacil.+Tazobactam R
	Cefazolin R
	Cefuroxim R
	Cefotaxim/Ceftriaxon R
	Imipenem R
	Meropenem R
	Oxacillin R
	Gentamicin S
	Tobramycin S
	Fosfomycin S
	Ciprofloxacin R
	Levofloxacin R
	Cotrimoxazol S
	Tetracyclin S
	Erythromycin R
	Clindamycin R
	Vancomycin S
	Teicoplanin S
	Linezolid S
	Fusidinsäure S
	Rifampicin S
	Mupirocin S
	(S=sens. I=interm. R=resistent)



monitoring: clinical/epidemiological relevant bacteria

(statistics every six months ... or on demand)

list of all cases (patients) with relevant bacteria (special drug resistance) including patients name, date of detection, clinic, ward etc.

Hybase 6 Statistik MVZ Dortmund - Mikrobiologie Labor Dr.Eberhard u. Partner Balkenstr. 17-19 44137 Dortmund	separate Niederschrift gemäß §23 IfSG (Erreger mit besonderen Resistenzen)	01.12.2011 bis 10.12.2011 Einsender: Krankenhaus St.Muster	Stat.: Station Muster 05
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Staphylococcus aureus

Ni Patient	Erstnachweis	GENTAMICIN	OXACILLIN	VANCOMYCIN	SYNERCID	TEICOPLAN	MOXIFLOXA	Bemerkung
1 Name / Vorname	Datum / Labor-Nr. / Station	R	S	S	-	S	-	Abstrich Blase
2 Name / Vorname	Datum / Labor-Nr. / Station	S	R	S	-	S	-	Abstrich Nasen-/Rachenraum oder Wunde nicht gekennzeichnet
3 Name / Vorname	Datum / Labor-Nr. / Station	S	R	S	-	S	-	Urin-Tauchmedium

Streptococcus pneumoniae (Pneumok.)
 --- Kein Befund ---

Enterococcus faecalis
 --- Kein Befund ---

Enterococcus faecium
 --- Kein Befund ---

Escherichia coli

Ni Patient	Erstnachweis	CEFOTAXIM	OFLOXACIN	CIPROFLOX	AMIKACIN	IMPENEM	CEFTAZIDIM	PIPERAC.+	CEFOTAXIM	MEROPENEM	LEVOFLOXA	Bemerkung
1 Name / Vorname	Datum / Labor-Nr. / Station	-	-	R	-	S	S	S	S	S	R	Urin-Tauchmedium
2 Name / Vorname	Datum / Labor-Nr. / Station	-	-	R	-	S	R	R	R	S	R	Abstrich Abdomen



list of all bacteria and the corresponding specimen / total frequency; revised > same patient and same specimen > counted only once

Hybase 6 Statistik MVZ Dortmund - Mikrobiologie Labor Dr. Eberhard u. Partner Balkenstr. 17-19 44137 Dortmund (Tel. Hr. Roßburg: 0231 / 9572-614)		Statistik - Verteilung Erreger - Material										01.12.2011 bis 10.12.2011		Stat.: Station Muster 05	
		Einsender: Krankenhaus St. Muster													
nur ein Erregernachweis pro Patient, im gleichen Material															
Erreger-Gruppe / Materialien - Gruppe	Gesamt	Abstrich (Sonstige)	Abstrich Bauch-raum	Abstrich Cervix/ Uterus	Abstrich Fuß/ Diabetes	Abstrich Gelenk/ Knochen	Abstrich Körper-oberfläche	Abstrich obere Atemwege	Abstrich Organe	Abstrich untere Atemwege	Abstrich Urethra	Abstrich Wunde/ Eiter	Biopsat/ Excision	Katheter: venös	Kult aer Blut
Gesamt	555	18	3	4	2	1	48	93	2	3	2	27	1	12	
Anzahl ausgewerteter Materialien	335	10	2	2	1	1	21	46	1	1	1	16	1	11	
Materialien mit einem Erreger	178	7	1	0	0	1	6	8	0	0	0	8	1	10	
Materialien mit 2 Erregern	109	0	1	2	1	0	10	30	1	0	1	5	0	1	
Materialien mit 3 Erregern und mehr	48	3	0	0	0	0	5	8	0	1	0	3	0	0	
E1 Acinetobacter spp.	4							1							
E1 Bacteroides spp.	4	1						1				2			
E1 Campylobacter jejuni	1														
E1 Candida albicans	24	1					1	1				1		1	
E1 Candida glabrata	6						1								
E1 Candida spp. (non-albicans/-krusei/-glabrata)	4														
E1 Citrobacter spp.	1														
E1 Clostridium spp. (non-perfringens/-tetani)	9														
E1 Corynebacterium spp. (non-diphtheriae)	1						1								
E1 Coryneforme Bakterien	5							1							
E1 Enterobacter spp.	9	1					1	2							
E1 Enterococcus faecalis	8	2		1			1					1		1	
E1 Enterococcus faecium	11	1	1				1					1		1	



sensitive antibiotics for important bacteria / in parenthesis number of isolates; revised > same bacteria, same patient and same specimen > counted only once

Hybase 6 Statistik MVZ Dortmund - Mikrobiologie Labor Dr.Eberhard u. Partner Balkenstr. 17-19 44137 Dortmund		Übersicht Erreger-Resistenzen Resistenzen - Vergleich sensibel			01.12.2011 bis 10.12.2011 Einsender: Krankenhaus St.Muster		Stat.: Station Muster 05	
nur ein Erregernachweis pro Patient, im gleichen Material, Strategie: zeitlicher Verlauf				Interpretation: voll sensibel in [%] (Anza				
Antibiotika / Erreger-Gruppen	E1 Enterobacter spp.	E1 Enterococcus faecalis	E1 Enterococcus faecium	E1 Enterococcus spp. (non-faecalis/-faeci	E1 Escherichia coli	E1 Klebsiella pneumoniae	E1 Proteus spp.	
Ampic./ Amoxic.	0% (7)	100% (6)	10% (10)	100% (27)	53% (76)	0% (19)	33% (12)	
Amoxic. + Clavulans.	0% (7)	100% (6)	10% (10)	100% (27)	67% (76)	63% (19)	58% (12)	
Mezlocillin	57% (7)	100% (6)	10% (10)	100% (27)	53% (75)	0% (19)	42% (12)	
Piperacillin	57% (7)	100% (6)	10% (10)	100% (27)	54% (76)	0% (19)	42% (12)	
Gentamicin	86% (7)	0% (6)	0% (10)	0% (27)	92% (73)	83% (18)	92% (12)	
Tobramycin	86% (7)	0% (6)	0% (10)	0% (27)	88% (76)	84% (19)	92% (12)	
Ciprofloxacin	86% (7)	0% (6)	0% (10)	0% (27)	74% (76)	74% (19)	83% (12)	
Cotrimoxazol	86% (7)	0% (6)	0% (10)	0% (27)	68% (76)	79% (19)	42% (12)	
Tetracyclin	86% (7)				59% (76)	79% (19)	0% (12)	
Penicillin								
Erythromycin								
Clindamycin								
Oxacillin								
Vancomycin		100% (6)	80% (10)	100% (27)				
Imipenem	100% (7)	100% (6)	10% (10)	100% (27)	100% (76)	100% (19)	0% (12)	
Ceftazidim	57% (7)				87% (75)	63% (19)	67% (12)	
Ampic.+ Sulbactam	0% (7)	100% (6)	10% (10)	100% (27)	67% (76)	63% (19)	58% (12)	
Piperac.+ Tazobactam	57% (7)	100% (6)	10% (10)	100% (27)	68% (75)	63% (19)	58% (12)	
Cefotaxim/ Ceftriaxon	57% (7)	0% (6)	0% (10)	0% (27)	87% (76)	63% (19)	67% (12)	



... according to all medical issues it is useful to act as qualified, effective and innovative PARTNERS ...



... working hand in hand, and ...



... remembering hand disinfection!



(... the most important vehicle for microorganisms!)

Please support your hygiene-management !

Thanks for your attention!