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2017年至2019年阜阳某三级医院常见病原菌分布和细菌耐药性分析*

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摘要 目的:分析本院2017年~2019年常见病原菌分布和细菌耐药性情况,以指导临床用药。**方法:**将送检标本中的病原菌进行鉴定,参照CLSI 2017版判读药敏结果。**结果:**收集2017年7月~2019年6月临床分离菌共2292株,其中革兰阴性菌1862株,占81.2%,革兰阳性菌430株,占18.8%。大肠埃希菌占比最高,占25.7%。主要分离于尿液标本(55.9%)、血液标本(12.2%)和痰液标本(10.8%)。金黄色葡萄球菌中MRSA(耐甲氧西林金黄色葡萄球菌)和凝固酶阴性葡萄球菌中耐甲氧西林凝固酶阴性葡萄球菌(MRCNS)的检出率分别为61.4%和74.4%。MRSA主要分布于普外科、神经外科和骨科。未检出替考拉宁、利奈唑胺或万古霉素耐药的葡萄球菌。肠球菌属中屎肠球菌对测试药物的耐药率均较高。16株肺炎链球菌,其中3株对青霉素耐药。肠杆菌科细菌中,肺炎克雷伯菌对碳青霉烯耐药率为14.5%。鲍曼不动杆菌对碳青霉烯的耐药率为76.9%。铜绿假单胞菌为19.3%。14株流感嗜血杆菌中, β 内酰胺酶检出率为35.7%(5/14)。**结论:**2017年~2019年我院常见病原菌以革兰阴性杆菌为主,病原菌的耐药性较高,临床应加强科室管理,合理应用抗生素,防耐药菌株的流行,降低医院感染的发生风险。

关键词:药物敏感性试验;耐碳青霉烯类肠杆菌科细菌;细菌耐药监测

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Distribution and Drug Resistance of Common Pathogenic Bacteria in a Tertiary Hospital in Fuyang from 2017 to 2019*

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ABSTRACT Objective: To analyze the distribution and drug resistance of common pathogenic bacteria in our hospital from 2017 to 2019, so as to guide clinical medication. **Methods:** Pathogenic bacteria in the samples were identified and drug sensitivity results were interpreted according to CLSI 2017 edition. **Results:** A total of 2292 clinical isolates were collected from July 2017 to June 2019, including 1862 Gram-negative bacteria (81.2%) and 430 Gram-positive bacteria (18.8%). *Escherichia coli* accounted for 25.7% of the total. They were mainly isolated from urine samples (55.9%), blood samples (12.2%) and sputum samples (10.8%). The detection rates of MRSA (methicillin-resistant *staphylococcus aureus*) and MRCNS (methicillin-resistant coagulase-negative *staphylococcus*) in *staphylococcus aureus* were 61.4% and 74.4%. MRSA was mainly distributed in general surgery, neurosurgery and orthopedics. No teicoplanin, linezolid or vancomycin resistant staphylococci were detected. *Enterococcus* belongs to *Enterococcus faecium* with high drug resistance rate to the tested drugs. 16 strains of *Streptococcus pneumoniae*, 3 of which were resistant to penicillin. In Enterobacteriaceae, *Klebsiella pneumoniae* was 14.5% resistant to carbapenem. The drug resistance rate of *Acinetobacter baumannii* to carbapenem was 76.9%. *Pseudomonas aeruginosa* was 19.3%. Among 14 strains of *Haemophilus influenzae*, the detection rate of β -lactamase was 35.7%(5/14). **Conclusion:** Gram-negative bacilli are the most common pathogenic bacteria in our hospital from 2017 to 2019. The drug resistance of pathogenic bacteria is relatively high. Clinically, we should strengthen department management, rationally apply antibiotics, prevent the prevalence of drug-resistant bacteria, and reduce the risk of hospital infection.

Key words: Drug sensitivity test; Carbapenem-resistant Enterobacteriaceae bacteria; Bacterial drug resistance monitoring

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前言

抗生素具有干扰细菌细胞壁及蛋白质合成,和抑制核酸转

录和复制作用,现作用预防和治疗用药已广泛开展于临床^[1,2]。临床资料报道^[3],近年来随着抗菌药物的长期应用、联合应用和大量应用,细菌耐药情况较为突出,表现为细菌对抗生素不敏

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感现象,可分为全耐药株及多重耐药株,且耐药菌的生成逐渐增加,明显加大临床用药难度,降低药物疗效。临床调查显示^[4,5],重症加强护理病房(ICU)病原菌主要为铜绿假单胞菌、鲍曼不动杆菌、大肠埃希菌等革兰阴性杆菌,革兰阳性菌相对较少,非ICU病原菌分布也以革兰阴性菌为主。但有研究表明^[6],不同地区、医院由于抗菌药物的选择不同,导致细菌耐药性存在明显的地区性差异。因此加强某一地区医院细菌耐药性监测,掌握细菌分布和耐药情况,对抗菌药的规范应用有重要作用,且可提高临床效果,降低医疗费用。本研究主要分析2017年至2019年我院常见病原菌分布和细菌耐药性情况,为控制医院感染和抗生素的合理选择提供依据。

1 材料与方法

1.1 材料

1.1.1 细菌来源 收集2017年7月9日~2019年6月30日临床分离株,去除重复菌株。草绿色链球菌和凝固酶阴性葡萄球菌只收集脑脊液、血液等无菌部位分离菌。

1.1.2 试剂来源 链球菌属细菌用含5%脱纤维羊血MH琼脂,药敏纸片用Mueller-Hinton琼脂,以上均由合肥天达有限公司提供。药物纸片为英国OXOID公司产品。青霉素、复方新诺明Etest试验条为温州康泰有限公司商品。

1.1.3 细菌鉴定 所有菌株用全自动快速微生物分析仪和细菌鉴定仪进行测定和鉴别。

1.2 方法

1.2.1 药敏试验 参照2017年CLSI M100-s27th版推荐的纸片扩散法进行^[7],采用VITEK 2 Compact自动化仪器法,使用梅里埃GN、GN13、GP、GP67、N335。并判定药敏结果。

1.2.2 超广谱β内酰胺酶(ESBL)试验 对肺炎克雷伯菌、大肠埃希菌、产酸克雷伯菌、奇异变形杆菌,按CLSI推荐的纸片扩散法对两组中任何一个药物,在加克拉维酸后抑制圈与不加克拉维酸的抑菌圈相比,增加值≥5 mm时,判定为产ESBL。

1.2.3 耐药菌 分析多重耐药(MDR)菌株、广泛耐药(XDR)菌株、耐碳青霉烯类肠杆菌科细菌(CRE)情况。

1.2.4 数据统计分析 数据统计分析使用WHONET 5.6软件对细菌来源、构成、种类、科室分布、临床常用抗菌药物药敏结果等进行统计分析。

2 结果

2.1 细菌构成

共收集临床分离株2292株,其中革兰阳性菌430株,占18.8%,革兰阴性菌1862株,占81.2%。住院患者和门诊急诊患者分离的菌株分别占98.1%(2248株)、1.9%(44株)。痰液等呼吸道标本占比最高,为39.8%,其次尿液27.1%、血液14.2%、分泌物6.1%、脓液4.9%、其他无菌体液2.5%,其他标本6.4%。肠杆菌科细菌占有所有分离菌株的52.0%(1191对2292),其中大肠埃希菌49.5%(590株)、肺炎克雷伯菌29.1%(346株)、产酸克雷伯菌8.0%(95株)、阴沟肠杆菌3.4%(40株)、奇异变形杆菌3.2%(38株)、产气肠杆菌2.6%(31株)、摩氏摩根菌1.3%(16株);非发酵革兰阴性杆菌占有所有分离菌株的26.5%(608/2292),其中铜绿假单胞菌45.4%(276株)、鲍曼不动杆菌32.1%(195株)、嗜麦芽窄食单胞菌12.3%(75株)和洋葱伯克霍尔德菌1.6%(10株)。金黄色葡萄球菌和凝固酶阴性葡萄球菌在革兰阳性菌中分别占29.5%(127/430)和28.1%(121/430)。主要细菌菌株构成见表1。

表1 临床分离菌总体分布情况
Table 1 General distribution of clinical isolates

Organism	NO of isolates	Proportion(%)
<i>Escherichia coli</i>	590	25.7
<i>Klebsiella pneumoniae</i>	346	15.1
<i>Pseudomonas aeruginosa</i>	276	12.1
<i>Acinetobacter baumannii</i>	195	8.5
<i>Staphylococcus aureus</i>	127	5.6
*Coagulase negative staphylococci	121	5.3
<i>Klebsiella oxytoca</i>	95	4.1
<i>Stenotrophomonas</i>	75	3.3
<i>Enterobacter cloacae</i>	40	1.8
<i>Enterococcus faecium</i>	40	1.8
<i>Proteus mirabilis</i>	38	1.6
<i>Enterobacter aerogenes</i>	31	1.4
<i>Enterococcus faecalis</i>	30	1.3
<i>Serratia marcescens</i>	19	0.8
<i>Streptococcus pneumoniae</i>	16	0.7
<i>Morganella morganii</i> ss. <i>Morganii</i>	16	0.7
<i>Haemophilus influenzae</i>	14	0.6
<i>Serratia fonticola</i>	11	0.5

<i>Burkholderia cepacia</i>	10	0.4
<i>Aeromonas hydrophila</i>	10	0.4
<i>Citrobacter freundii</i>	10	0.4
<i>Achromobacter xylosoxidans</i>	7	0.3
Other	175	7.6
Combined meter	2292	100%

Note: * Coagulase-negative Staphylococcus from blood, CSF and other sterile body fluid.

2.2 革兰阳性球菌对抗菌药物的敏感率和耐药率

2.2.1 葡萄球菌属 金黄色葡萄球菌中 MRSA 检出率为 61.4%。凝固酶阴性葡萄球菌几乎来自血液标本, MRCNS 的检出率为 74.4%。MRSA 和 MRCNS 对红霉素、克林霉素、甲氧苄啶 - 磺胺甲噁唑和左氧氟沙星等抗菌药物的耐药率均明显高于 MSSA 和 MSCNS。MRSA 和 MRCNS 对克林霉素的耐药率

在 70% 左右 (74.4% 对 68.9%), 对甲氧苄啶 - 磺胺甲噁唑耐药率分别为 24.7% 对 68.9%。93.3% 的 MRCNS 对利福平敏感。MRSA 主要分布于普外科 (占 16.7%), 其次神经外科 (11.5%) 和骨科 (9.0%)。未检出替考拉宁、利奈唑胺或万古霉素耐药的葡萄球菌。见表 2。

表 2 葡萄球菌属对抗菌药物的耐药率和敏感率 (%)

Table 2 Susceptibility of Staphylococcus strains to antimicrobial agents (%)

Antimicrobial agent	MRSA (n=78)		MSSA (n=49)		MRCNS (n=90)		MSCNS (n=31)	
	R	S	R	S	R	S	R	S
Vancomycin	0	100	0	100	0	100	0	100
Teicoplanin	0	100	0	100	0	100	0	100
Linezolid	0	100	0	100	0	100	0	100
Rifampin	0	100	0	100	6.7	93.3	0	100
Levofloxacin	14.1	85.9	6.1	93.9	42.2	55.6	9.7	90.3
Gentamicin	5.3	94.7	10.9	82.6	11.1	75.6	0	100
Trimethoprim-sulfamethoxazole	24.7	75.3	16.3	83.7	68.9	31.1	29	71
Clindamycin	74.4	25.6	57.1	42.9	68.9	27.8	32.3	67.7
Erythromycin	76.9	23.1	57.1	42.9	93.3	6.7	61.3	35.5
Penicillin G	100	0	95.9	4.1	100	0	77.4	22.6
Oxacillin	100	0	0	100	100	0	0	100

2.2.2 肠球菌属 90 株肠球菌属中粪肠球菌 30 株, 屎肠球菌 40 株, 分别占 33.3% 和 44.5%; 其他肠球菌 20 株, 占 22.2%。粪肠球菌对绝大多数测试抗菌药物的耐药率均显著低于屎肠球菌, 粪肠球菌对除红霉素外其他测试药物的耐药率均在 50% 及

以下。屎肠球菌对测试药物的耐药率均较高, 对氨苄西林、左氧氟沙星、红霉素和高浓度庆大霉素的耐药率均 >69%。粪肠球和屎肠球见表 3。

表 3 粪肠球菌和屎肠球菌对抗菌药物的耐药率和敏感率 (%)

Table 3 Susceptibility of Enterococcus faecalis and Enterococcus faecium to antimicrobial agents (%)

Antimicrobial agent	<i>E. faecalis</i> (n=30)		<i>E. faecium</i> (n=40)	
	R	S	R	S
Vancomycin	0	100	0	100
Teicoplanin	0	100	0	100
Linezolid	0	100	0	100
Nitrofurantoin	0	100	25	22.2
Ampicillin	0	100	87.2	12.8
Levofloxacin	20	80	87.5	7.5
Gentamicin-High	50	50	77.5	22.5
Erythromycin	85.7	14.4	88.2	2.9

2.2.3 链球菌属细菌 16 株肺炎链球菌, 对青霉素耐药率为 18.7%(3 株), 对红霉素和克林霉素耐药率较高, 为 93.3%(15 株)。未检出利奈唑胺和万古霉素耐药菌株。

2.3 革兰阴性杆菌对抗菌药物的敏感率和耐药率

2.3.1 肠杆菌科细菌 大肠埃希菌和肺炎克雷伯菌产 ESBL 菌株的检出率分别为 62.2%和 25.6%; 大肠埃希菌主要分布于

尿液标本中, 330 株, 占 55.9%(330/590)。大肠埃希菌对左氧氟沙星和环丙沙星分别为 61.1%、64.3%, 明显高于肺炎克雷伯菌的 22.5%和 27%; 但大肠埃希菌对碳青霉烯耐药率为 0.2%, 明显低于肺炎克雷伯菌 14%左右。两者对替加环素、多黏菌素 B、阿米卡星、哌拉西林 / 他唑巴坦均低于 18%。见表 4。

表 4 主要肠杆菌科细菌对抗菌药物的耐药率和敏感率(%)

Table 4 Susceptibility of major Enterobacteriaceae species to antimicrobial agents(%)

Antimicrobial agent	<i>E. coli</i> (n=590)		<i>K.pneumoniae</i> (n=346)	
	R	S	R	S
Tigecycline	0	100	0.7	95.6
Polymyxin B	0	100	0	100
Imipenem	0.2	99.8	14.5	85.3
Meropenem	0	99.8	14.2	83.6
Cefepime	21.9	69.2	20.8	76.3
Ceftazidime	34.2	65.3	26	72.8
Ceftriaxone	65.9	33.9	40.2	59.8
Cefoperazone-sulbactam	8.8	71.2	20	70.3
Cefazolin	67.4	32.6	40.4	59.6
Piperacillin-tazobactam	2.7	94.6	15	81.5
Ampicillin	89.3	10.2	84.4	1.2
Ampicillin-sulbactam	54.3	21.9	41.1	54
Amikacin	5.5	93.9	11.8	88.2
Gentamicin	45	53.1	30.3	68.8
Ciprofloxacin	64.3	34.1	27	70.6
Levofloxacin	61.1	35.8	22.5	75.1
Nitrofurantoin	3.4	84.2	36.1	18.1
Trimethoprim-sulfamethoxazole	59.7	40.3	27.2	72.8

2.3.2 非发酵革兰阴性杆菌 276 株铜绿假单胞菌对亚胺培南和美罗培南的耐药率分别为 19.3%和 17.0%; 对多黏菌素 B 和阿米卡星的耐药率分别为 0 和 1.8%; 对所测试的两种酶抑制剂复合剂、庆大霉素、环丙沙星、左氧氟沙星、头孢吡肟和哌拉西林的耐药率 <23%。195 株鲍曼不动杆菌对亚胺培南和美

罗培南的耐药率均为 76.9%; 对头孢哌酮 - 舒巴坦和米诺环素的耐药率分别为 70.9%和 14.8%, 对多黏菌素 B 和替加环素的耐药率较低 (0 和 4.5%), 对其他测试药的耐药率多在 66%以上。见表 5。

表 5 主要非发酵革兰阴性菌对抗菌药物的耐药率和敏感率(%)

Table 5 Susceptibility of non-fermentative gram-negative bacilli to antimicrobial agents(%)

Antimicrobial agent	<i>P.aeruginosa</i> (n=276)		<i>A.baumannii</i> (n=195)	
	R	S	R	S
Piperacillin	23.7	50.7	NA	NA
Amikacin	1.8	94.2	73.9	25
Gentamicin	9.2	83.1	75.9	24.1
Piperacillin-tazobactam	12.7	66.7	78.8	15.8
Cefoperazone-sulbactam	20.3	61.8	70.9	22.9
Cefepime	9.2	82	75.9	22.1
Ampicillin-sulbactam	NA	NA	76.2	21.2
Aztreonam	32.6	43.5	NA	NA
Imipenem	19.3	71.6	76.9	23.1

Meropenem	17	78.6	76.9	23.1
Ciprofloxacin	18.7	74.5	77.4	22.6
Levofloxacin	21.1	70.2	77.2	22.6
Trimethoprim-sulfamethoxazole	NA	NA	66.3	33.7
Polymyxin B	0	100	0	100
Tigecycline	NA	NA	4.5	89.4
Minocycline	NA	NA	14.8	76.1

NA: not available.

2.3.3 碳青霉烯类抗生素耐药菌株 共检出 272 株碳青霉烯类药物耐药菌株, 占有革兰阴性杆菌的 11.9%。碳青霉烯类耐药的鲍曼不动杆菌(CRAB)占 56.3%(153/272), 其次是碳青霉烯类耐药的肺炎克雷伯菌(CRKP)和碳青霉烯类耐药的铜绿假单胞菌(CRPA), 分别占 21%和 12.8%。CRAB 检出率最高的科室是 ICU(30%), 其次是神经外科(27.3%)和 EICU(16%); CRKP 检出率最高科室的是神经外科 (45.6%), 其次是 ICU (17.5%)和急诊内科(8.8%); CRPA 检出率最高是神经外科, 占 39.6%, 其次是呼吸内科(37.7%)、神经内科(5.7%)。在标本分布中, CRAB、CRKP 和 CRPA 在痰等呼吸道标本的检出率最

高, 分别占各自菌种的 86.7%、80%和 92%。本年度共检出 CRE 菌株 83 株, 占有肠杆菌科细菌的 7.0%, CRE 菌株主要分布在神经外科和 ICU, 分别占 35%和 13.3%, 占碳青霉烯类药物耐药菌株 27.9%。CRE 对测试的多种抗菌药物耐药率较高。碳青霉烯类耐药肺炎克雷伯菌对甲氧苄啶 - 磺胺甲噁唑耐药率为 31.6%, 对米诺环素耐药率为 20%, 替加环素与多粘菌素耐药率低, 分别为 1.8%和 0, 其余测试抗菌药物耐药率均 >60%。CRE 主要分离自呼吸道标本和尿液标本, 分别占 60.7%、21.4%。CRAB、CRKP 和 CRPA 对各抗菌药物的耐药率见表 6。

表 6 碳青霉烯类抗生素耐药菌株对各类抗菌药物的耐药率和敏感率(%)

Table 6 Susceptibility of carbapenem-resistant strains to antimicrobial agents(%)

Antimicrobial agent	CRKP(n=57)		CRPAE(n=62)		CRAB(n=153)	
	R	S	R	S	R	S
Ampicillin	100	0	NA	NA	NA	NA
Ampicillin-sulbactam	100	0	NA	NA	98	0
Piperacillin-tazobactam	98.2	0	45.2	27.4	100	0
Cefazolin	100	0	NA	NA	NA	NA
Imipenem	96.5	1.8	100	0	100	0
Meropenem	94.7	1.8	79.0	8.9	99.3	0.7
Cefepime	98.2	1.8	39.1	47.8	98	0
Ceftazidime	100	0	36.1	34.4	100	0
Ceftriaxone	100	0	NA	NA	100	0
Amikacin	61.4	38.6	1.6	91.9	95.2	3.4
Gentamicin	91.2	8.8	27.4	64.5	98	2
Ciprofloxacin	91.2	7	49.2	37.7	100	0
Levofloxacin	89.5	8.8	59	29.5	100	0
Minocycline	20	60	NA	NA	18.3	70.4
Tigecycline	1.8	92.9	NA	NA	5.6	85.9
Polymyxin B	0	100	0	100	0	100
Cefoperazone-sulbactam	98.2	1.8	61	16.9	90.9	1.4
Trimethoprim-sul-famethoxazole	31.6	68.4	NA	NA	84.2	15.8

CRKP: carbapenem-resistant *k.pneumoniae*, CRAB: carbapenem-resistant *acinetobacterbaumannii*.

CRPA: carbapenem-resistant *pseudomonas aeruginosa* na not available.

2.3.4 流感嗜血杆菌 14 株流感嗜血杆菌中, 1 株来源于静脉全血, 13 例来自痰标本。 β 内酰胺酶检出率为 35.7% (5/14)。

3 讨论

目前由于广谱抗菌药物的广泛应用, 细菌耐药性不断上升, 明显增加抗感染治疗难度, 降低临床效果^[89]。因此及时了解主要病原菌的分布情况, 并进行细菌耐药性监测有重要价值。本研究结果显示, 常见病原菌分布中革兰阴性菌 1862 株, 占

81.2%, 革兰阳性菌 430 株, 占 18.8%, 较既往文献报道的革兰阴性菌和革兰阳性菌所占比率有一定差异^[10]。本研究中分离的细菌中大肠埃希菌占比最高为 25.7%, 其最易导致泌尿系统和呼吸系统感染。其次肺炎克雷伯菌和铜绿假单胞菌, 后者为条件致病菌, 感染后容易与咽部定植, 且难以清除^[11,12]。菌株主要来源于呼吸道标本和尿液标本, 呼吸道标本的分离率与 2017 年 CHINET 的监测数据几乎一致, 尿液标本明显高于 CHINET 的监测数据, 可能由于我院泌尿外科重视送检率及送检质量, 严格把握送检指针并在使用抗生素前采集清洁中断尿并及时送检。葡萄球菌中 MRSA 检出率为 61.4%, 检出率高于历年 CHINET 细菌耐药监测结果, 其传染性较强, 能够通过转座子、质粒等将耐药性传递至其他菌株, 且在 ICU 中容易引起爆发流行^[13,14]。我院 MRSA 检出率高可能由于 MRSA 主要分布于普外科和骨科, 普外科主要手术切口多, 多为伤口分泌物或引流液送检培养, 骨科的 MRSA 感染可能由于侵入性操作多, 伤口愈合不良, 手术时间长等多因素所致。大肠埃希菌产 ESBL 菌株的检出率为 62.2%, 肺炎克雷伯菌为 25.6%, 我院 ESBL 菌株的检出率高于往年 CHINET 监测数据, 因此应加大临床的重视程度^[15]。我院大肠埃希菌对左氧氟沙星和环丙沙星耐药率分别为 61.1% 和 64.3%, 与 2005-2014 年 CHINET 大肠埃希菌耐药性监测结果基本一致。尿液标本检出的 591 例细菌中, 大肠埃希菌为 55.8%, 占比最高, 同文献报道一致^[16]。

药敏试验结果显示, 检测为 CRE 菌株的 ESBL 检测结果几乎为阴性。相关文献报道, 碳青霉烯酶对 ESBL 的检测存在一定的干扰, 对 CRE 菌株检测相关 β 内酰胺酶耐药基因结果发现, 90% 以上的菌株可产碳青霉烯酶和 ESBL^[17]。因此, 相关研究建议实验室对于 CRE 菌株的 ESBL 检测结果无需报告^[18]。本监测结果显示, 肺炎克雷伯菌对亚胺培南和美罗培南的耐药率为 14.5% 和 14.2%, 高于临床研究的耐药监测^[19]结果。而铜绿假单胞菌和鲍曼不动杆菌对亚胺培南的耐药率分别为 19.3% 和 76.9%, 在既往的细菌监测的耐药率范围分析得出 CRE 菌株中, 肺炎克雷伯菌占比最高^[20,21]。CRE 菌株给临床抗感染治疗带来极大困难, 临床研究报道^[22], CRKP 引起的感染死亡率可达 23%~75%, 应引起高度重视。我院临床分离的 CRE 菌株主要集中在神经外科和 ICU, 分别占 35% 和 13.3%。临床资料显示^[23], CRE 分布稍有不同, 有的主要分离于 ICU 和呼吸科, 大多主要分布于 ICU。我院 CRE 主要集中于神经外科, 可能因为入住我院神经外科患者相对多, 大多神志不清, 不能自主咳痰, 而且抵抗力差, 容易并发感染。CRE 主要分离自呼吸道和尿液标本, 与研究报道一致^[24]。另外此病区患者多合并较严重的基础疾病, 侵袭性操作相对较多, 因此临床应加强相关科室的感染防控。文献显示 CRE 的主要耐药机制为产碳青霉烯酶等^[25,26]。治疗 CRE 感染的最有效药物为替加环素和多黏菌素, 但已有对两种药物耐药的报道^[27,28]。

综上所述, 2017 年~2019 年我院常见病原菌以革兰阴性杆菌为主, 病原菌的耐药性较高, 临床应加强科室管理, 合理应用抗生素, 防耐药菌株的流行, 降低医院感染的发生风险。

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