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红细胞分布宽度与ICU院内感染的相关性研究

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摘要 目的:探索红细胞分布宽度(RDW)与ICU院内感染的相关性。**方法:**根据2001年卫生部颁布的医院感染诊断标准,筛选出2011年1月至2013年12月在ICU住院发生院内感染的224例患者,与同期在ICU住院未发生院内感染的患者232例,收集相关临床资料[年龄、性别、既往合并高血压、冠心病史、慢性病(APACHE II)评分、住院时间、预后]及RDW等实验室指标(连续收集入ICU前三天的实验指标取平均值),分析RDW与院内感染发生的相关性。**结果:**与对照组RDW(12.18 ± 1.08)%相比,院内感染组RDW(13.52 ± 2.01)%明显升高,差异有统计学意义($P < 0.01$)。多因素logistic回归分析显示,RDW是院内感染的独立预测因素($OR=4.75$, 95% CI: 3.27~6.91, $P < 0.01$)。RDW界值为12.81%, RDW的ROC曲线下面积为(0.76 ± 0.02)%, 95% CI: 0.71~0.80, 诊断院内感染的敏感性为56.65%, 特异性为85.75%。**结论:**RDW与ICU院内感染独立相关,是ICU院内感染的独立预测因素。

关键词:院内感染;红细胞分布宽度;ROC曲线

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Correlation of Red Blood Cell Distribution Width and Nosocomial Infections in ICU

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ABSTRACT Objective: To explore the correlation between red blood cell distribution width (RDW) and nosocomial infection in ICU. **Methods:** According to the diagnostic criteria of nosocomial infections issued by the Ministry of Health in 2001. Screened two hundred and twenty-four patients with nosocomial infections admitted to our hospital patients in the ICU from January 2011 to December 2013, with the same period, two hundred and thirteen patients without nosocomial infection in the ICU. Their clinical data [Age, Gender, Hypertension, Coronary heart disease, Chronic disease (APACHE II) score, Length of stay, the prognosis] and RDW et other laboratory indicators (The averaged value of experiments indicators were collected continuously into the ICU three days before) were recorded. Analyzing the correlation between RDW and nosocomial infections in ICU. **Results:** The RDW in the group of nosocomial infection was (13.52 ± 2.01)%, it increased significantly compared with that in the control group ($P < 0.01$). Multivariate logistic regression analysis showed that, the RDW was an independent predictor of nosocomial infection ($OR=4.75$, 95 % CI: 3.27 ~ 6.91, $P < 0.01$). The RDW threshold value is 12.81 percent and the RDW area under the ROC curve was (0.76 ± 0.02) %, (95% CI: 0.71 ~ 0.80), a diagnostic sensitivity was 56.65 % and a specificity was 85.75 % for the nosocomial infections in ICU. **Conclusion:** RDW is independently correlated with the nosocomial infections in ICU, and is thus an independent predictor for the nosocomial infections in ICU.

Key words: Nosocomial infections in ICU; Red blood cell distribution width; ROC curve

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前言

红细胞分布宽度 (Red blood cell distribution width, RDW) 作为全血细胞计数的常规组成部分而被临床医生广泛使用,它是反映外周血红细胞体积大小的指标^[1]。

医院感染(Nosocomial Infection, Hospital Infection 或 Hospital Acquired Infection)是指住院病人在医院内获得的感染,包括在住院期间发生的感染和在医院内获得出院后发生的感染;但不包括入院前已开始或入院时已存在的感染。医院工作人员在医院内获得的感染也属医院感染^[2]。重症监护科(ICU)是医院危重症患者集中的地方,且多数患者需行有创性操作,因此院内感染情况也较其他科室严重。据了解,RDW与ICU患者院内感染的相关性未见有具体研究。本研究通过病例分析推测高水平的RDW与ICU患者发生院内感染的机率可能是独立

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相关的。对于ICU院内感染的预测,不仅在ICU患者资源配置中很有价值,而且在监测治疗进展及比较治疗效果方面也有很大的帮助。

1 资料与方法

1.1 一般资料

选择2011年1月至2013年12月我院ICU发生院内感染的患者224例,平均年龄(65.69 ± 15.71)岁,其中,男126(56.25%),女98例(43.75%);未发生院内感染患者232例,平均年龄(62.53 ± 14.47)岁,其中,男130例(56.03%),女102例(43.97%)。所选病例均符合2001年卫生部颁布的医院感染诊断标准。排除标准:入ICU时已患院内感染、心肺复苏术后、各种血液系统疾病、近期输血史、ICU住院时间 ≤ 5 天的患者。

1.2 方法

收集患者的相关临床资料,如年龄、性别、既往合并高血压、冠心病史、慢性病(APACHE II)评分、住院时间、预后,及入

ICU前3天的RDW等实验室指标(取平均值)。

1.3 统计学方法

采用SPSS16.0统计软件,数据以均数 $\pm$ 标准差($\bar{x} \pm s$)或相应例数表示。计数资料用 χ^2 检验,计量资料用t检验, $P < 0.05$ 认为差异有统计学意义;利用单因素及多因素Logistic回归分析方法筛选发生院内感染的危险因素($\alpha_{入} = 0.10, \alpha_{出} = 0.15$),检验水准 $\alpha = 0.05$ 。

2 结果

2.1 两组一般临床资料特征

研究结果显示,与对照组相比,院内感染组的年龄偏大,大部分患者既往合并有高血压、冠心病史,APACHE II评分、住院时间、死亡率、RDW明显升高,差异具有统计学意义($P < 0.01$),而血红蛋白(Hemoglobin, HB)明显下降,差异具有统计学意义($P < 0.01$,如表1)。

表1 院内感染组与对照组一般资料的比较

Table 1 Comparison of general information between the group of nosocomial infections and the control group

Item	The group of nosocomial infections	The control group	P Value
Age (years)	65.69 $\pm$ 15.71	62.53 $\pm$ 14.47	0.012
Women (number of cases %)	98(43.75%)	102(43.97%)	0.519
Hypertension (number of cases %)	114(50.89%)	76(32.76%)	0.000
Coronary heart disease (the number of cases %)	107(47.77%)	64(27.59%)	0.000
APACHE II score	21.18 $\pm$ 8.67	16.01 $\pm$ 6.64	0.000
Length of stay (days)	19.64 $\pm$ 13.38	8.29 $\pm$ 3.42	0.000
Deaths (number of cases %)	114(50.89%)	46(19.83%)	0.000
Hemoglobin(g/L)	104.51 $\pm$ 16.06	110.01 $\pm$ 13.17	0.000
Red blood cell distribution width (%)	13.52 $\pm$ 2.01	12.18 $\pm$ 1.08	0.000

Note:☆ $P < 0.01$ any other groups compared with control group.

2.2 多因素的 logistic 回归分析

将上述指标进行logistic单因素分析显示,除HB外,其他均为院内感染的危险因素($P < 0.01$),进一步多因素分析显示,

年龄、既往合并高血压、冠心病史,APACHE II评分、住院时间、死亡率和RDW仍是院内感染的独立预测因素(如表2)。

表2 多因素 logistic 回归分析

Table 2 Multivariate logistic regression analysis

Item	Univariate			Multivariate		
	OR	95 %CI	P	OR	95 %CI	P
Age (years)	1.24	1.06-1.44	0.000	1.23	0.90-1.66	0.189
Hypertension (number of cases %)	2.13	1.46-3.11	0.000	1.63	0.83-3.19	0.000
Coronary heart disease (the number of cases %)	2.40	1.63-3.55	0.000	1.95	0.95-4.02	0.156
Length of stay (days)	8.47	5.68-12.63	0.000	11.42	6.62-19.71	0.000
APACHE II score	1.93	1.52-2.45	0.000	1.64	1.08-2.48	0.020
Deaths (number of cases %)	4.19	2.77-6.35	0.000	13.56	6.04-30.46	0.000
Hemoglobin(g/L)	0.57	0.46-0.69	0.000	0.47	0.32-0.70	0.000
Red blood cell distribution width (%)	2.48	2.02-3.05	0.000	4.75	3.27-6.91	0.000

2.3 RDW 诊断院内感染的界值

RDW界值为12.81%,ROC曲线下面积为(0.76 ± 0.02)%

,95%CI:0.71~0.80,诊断院内感染的敏感性为56.65%,特异性为85.75%(如图1)。

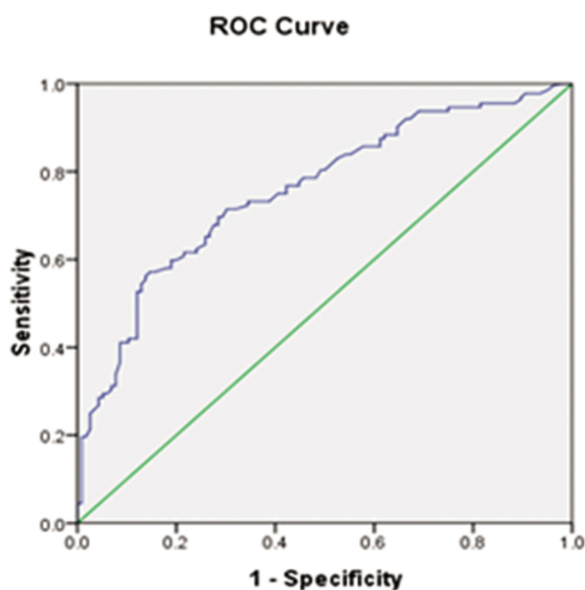


图1 ROC曲线诊断院内感染敏感性与特异性

Fig.1 ROC curve diagnosis sensitivity and specificity of nosocomial infections

3 讨论

这是一项分析RDW与ICU院内感染相关性的回顾性调查研究,本次研究的结果主要显示RDW升高是ICU院内感染的独立危险因素,经ROC曲线分析,RDW界值为12.81%,ROC曲线下面积为 (0.76 ± 0.02) ,95%CI:0.71~0.80,诊断院内感染的敏感性为56.65%,特异性为85.75%。同时,我们也发现住院时间也是ICU院内感染的独立危险因素,老年患者,尤其伴有基础病(高血压及冠心病)者更易发生院内感染,并且院内感染增加患者的死亡风险,这与国内的一些研究报道相符^[3-5]。因此对于预测ICU院内感染不仅在ICU患者资源配置中很有价值,而且在监测治疗进展,比较治疗效果方面也有帮助。

一直以来,RDW常常被用作贫血分型的重要指标之一。RDW升高多见于无功能红细胞增多(如缺铁、维生素B12或叶酸缺乏等),红细胞破坏增加(如溶血),或输血后^[6]。尤其,RDW升高可迅速反映红细胞消亡,这是与不良结果相关联的^[7]。近年来,一系列的研究显示,RDW可以作为预测心血管疾病,如心衰^[8-9]、稳定型冠心病^[10]、急性冠脉综合征^[11]、休克^[12]、急性肺栓塞^[13]及肺动脉高压^[14]等预后的独立指标。并且,相关人口全因死亡率的增加与RDW升高也是有关联的^[15-17]。较高的RDW值往往见于老年人,更可能伴随有感染,血红蛋白水平降低及CRP升高^[18],可以想象RDW升高在危重患者代表多种有害病理过程同时发生(如贫血,肾功能不全,营养不良,老龄化和炎症等)^[19]。一项前瞻性临床调查研究显示^[20],RDW升高可作为ICU患者高死亡率的一项强有力的独立预测因子。然而,这些都不能完全解释RDW与院内感染的相关性。RDW可反映细胞膜完整性,而RDW升高可能是膜不稳定的信号,这可能对许多器官功能产生不利影响^[21]。本项研究也存在一定的局限性,我们没有调查RDW升高的详细原因,这可能混淆RDW和院内感染

之间的关系;而且没有进行RDW的动态观察,不清楚当病人的病情逐渐恶化时,RDW水平是否逐步升高。因此需要更进一步的研究,阐明RDW与院内感染的病理生理机制。

总之,我们发现RDW升高是ICU院内感染的独立危险因素,作为ICU院内感染的临床预测指标具有重要意义。因RDW可从日常血常规中广泛获取且具有很高的可重复性,在

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