临床医学研究: 2022 年 4 卷 8 期
ISSN: 2705-0939(Print); 2705-0475 (Online)

系统化护理对 ICU 重症患者呼吸机相关性肺炎（VAP）发生的影响

夏陈妮
上海中医药大学附属龙华医院 上海 200032

【摘　要】：目的：忯♠ ICU 扇失芻尉扃壨孳寁卄勿墠傚ナ勼攉鱋mV咪妠デ刜岤垠暨VAP暩她凅中⇑ 方法：掫咪憔ᶠᵍ勃掂 2021 兡 4 咔-2022 兡 6 咔咱挽卻叵她 ICU 扇失芻尉 156 〕罊▾ 同偉佢ゅ噱倻ナ狣优ᶜ┳ 傚埡宧丆復傒宧罊嗷宧 78 〕⇑ 傚埡宧芻尉厒丨兑循勿墠罊復傒宧厒丨孳寁卄勿墠罊傚嗺┣ 宧芻尉她勿墠叼哖⇑ 结果：慄慮傚嗺┣ 宧她偳摽家哖罊傚埡宧她鱋mV咪妠デ刜岤垠暨VAP暩勼攉塺呖 8.97%罊復傒宧 1.28%暻傚嗺┣ 宧芻尉她勿墠均劂鼻罊復傒宧┳ 94.89%罊傚埡宧┳ 83.33%暻ᵡᵀᴸ俠罊傚嗺┣ 宧慄嘐nm她獷嘐⇐鱋mV⇐処塺ᵗᵉᶰ卄罊復傒宧GHz揹匸啥忯♠家哖懿呜帡☞╝ 傚埡宧罊宧挽儳写优咕寁忏偕劂┗ 暨P瞥0.05暩⇑ 结论：扃壨孳寁卄勿墠傚 ICU 扇失芻尉甍彐┳ 六兟揯罊峎侨ᶜ偳咕叼她厒撣芻尉她勿墠均劂媝鼻罊一傾鱋mV咪妠デ刜岤垠暨VAP暩她勼攉罊号亂芻尉獷嘐⇐鱋mV⇐処塺GHz揹匸啥罊傚┳ 六噤夔峎侨惀ㄷ湊俍她慈ㄴㄷ× 壨罊ぇ甍芻尉傍吹丹侜罊┳ 六即全关壨◐ 入慆撣⇑

【关键词】：ICU 扇失暻孳寁卄勿墠暻勿墠叼哖

Effect of Systematic Nursing on Ventilator-associated Pneumonia (VAP) in ICU Patients

Chenni Xia

Longhua Hospital Shanghai University of Traditional Chinese Medicine Shanghai 200032

Abstract: Objective: To evaluate the effect of systematic nursing on ventilator-associated pneumonia (VAP) in ICU patients. Methods: 156 ICU severe patients received in our hospital from April 2021 to June 2022 were randomly selected and divided into control group and observation group with 78 cases in each group by digital parity method. The patients in the control group provided routine nursing and the patients in the observation group provided systematic nursing. The nursing effects of the two groups were compared. Results: By comparing the experimental results of the two groups, the incidence of ventilator-associated pneumonia (VAP) in the control group was 8.97%, and that in the observation group was 1.28%; the nursing satisfaction of the two groups was compared, 94.89% in the observation group and 83.33% in the control group; in addition, comparing the changes of blood gas, respiration and heart rate after ventilation between the two groups, the evaluation results of various indicators in the observation group were significantly better than those in the control group, and the differences between the groups were statistically significant (P < 0.05). Conclusion: Using systematic nursing for clinical intervention of ICU severe patients can effectively improve the nursing satisfaction of patients, reduce the occurrence of ventilator-associated pneumonia (VAP), improve the indicators of blood gas, respiration and heart rate of patients, play a good auxiliary role in clinical treatment, promote the recovery of patients as soon as possible, and have high clinical application value.

Keywords: ICU severe; Systematic nursing; Nursing effect

芻尉卻ᵗᵉᶰ嘐嬝ᶜ冗勃嘐嬝厒嬝咦nm罊咪啉慄嘐仞㈤チ儀呀ピnA峎♂丅墇┆ 婃ダ吣她岤偳恽剃剽唲罊┳ 六┥ 媕┳ 鱋mV咪妠デ刜岤垠罊呖┆ 婃採▾ 噤圖她岤垠罊伉㈥掂毘澤剃岤垠冶┥ 罊僊╝ 呱デ拳她┆ 婃孌伻ᵛᶫ⇑ μℓ墠咕叼她勿墠卿否呖一傾㊦揯捨鱋mV咪妠デ刜岤垠丅墇她扇徥墆嵛⇑┳ 六㈥┤■ Gy【壨呱┳ ╚ ├ 她㈥夔勴咦噤夔芻尉呀罊猛徥勿墠■ Gy傚芻尉她夼剝堡凌甍彐偵ᶜ復傒罊┄壨嬋偕咕叼她孳寁卄勿墠喤官甍彐┳ 六兟揯罊▾ 嗔捻♫丅墇鱋mV咪妠デ刜岤垠她啿塺罊峎侨ᶜ偳寰微芻尉她太央罊阨㈥ナ攉一╚攉偊恺扉罊阨㈥┳ 六夔叼⇑ 佢╝ 嗔罊咤嗂偳摽┳ 徥傚勃掂叵噤她 / 34 〕 GAS 扇失芻尉扃壨孳寁卄勿墠她兟揯叼哖甍彐ᶜ哑罊忯♠傚勼攉鱋mV咪妠デ刜岤垠暨T？N瞥她凅中罊兢毘澤┐ 慆┳ 均劂她叼哖罊二⊡俏┐ ⇑

1 一般资料和实验方法

/ ,/ 悚吗

掫咪憔ᶠᵍ勃掂 0. 0/ 兡 2 咔+0. 00 兡 4 咔咱挽卻叵她 GAS 扇失芻尉 / 34 〕罊▾ 同偉佢ゅ噱倻ナ狣优ᶜ┳ 傚埡宧丆復傒宧罊嗷宧 56 〕罊┣ 宧芻尉懿姬剝偳摽偷ピ傃兢崶

劌嬓尧偳摽kℓ劂 ⅱ⇑咤嗂偳摽儲寀慮(ㅂ)掂❀墠俱Gy♂她勫ン忒忾⇑ 勍咕剪屘懿└ 咪啉憟嘐噤夔唅ン妠嫠罊兢卵掃라 ㄱㅁ剃岤垠剪屘⇑復傒宦剪屘壳 13 〕罊告 11 〕罊瓸斃 1. +10 僖罊戺优兡斃暨1/,52) . ,43暩禧罊介婺 / +0 儀呀罊戺优暨/,47 ¤ . ,/ 4暩儀呀罊ナ┥ 刚剃処岌嗩嗚 /. 〕罊処ㄱ頀嫙 5 〕罊剔唲剃☎ザ 1 〕罊鱋mV孳寁夬夼 2 〕罊崥侠ㅎ 5 〕罊預傻夼剪屘 0 〕暻傚埡宦剪屘壳 12 〕罊告 12 〕罊瓸斃 1/+11 僖罊戺优兡斃暨10,41) . ,2/ 暩禧罊介婺 0+1 儀呀罊戺优暨0,66 ¤ . ,15暩儀呀罊崥侠ㅎ 1 〕罊処ㄱ頀嫙 2 〕罊剔唲剃☎ザ 4 〕罊鱋mV孳寁夬夼 /. 〕罊囆ㅛ憺夬夼 0 〕罊預傻夼剪屘 2 〕罊岧峇夬夼 2 〕⇑ 傚嗟┣ 宦剪屘她┆ 崹悚吗罊儳写吳寁忏偕劂┻ 暨N暾. ,. 3暩⇑

/,0 吤噱

勍咕剪屘夕掂nm密┺ 鱋mV咪↞嘐嬝厒嬝慈ㄴ咪啉憟嘐罊懿懘彐徼厹挑事⇐ㅛ奅嗒丞罊傚ナ嚶壳徼恍孷╓ ⇐截娼挑录懘彐宇嗓罊厏丨傚失噤夔⇐史匷噤夔⇐勷瓘學噤夔嫽⇑密傚埡宦扃壨兑循勿墠兟揯卿否罊ナ┥ ㅇㅇ匡撙鞶勿墠⇐夼剝妒諙⇐処墠夏傝嫽ピ傃⇑

復傒宦伉傚埡宦她佢娘┐ 扃壨孳寁ㅛ勿墠卿否罊ㄷ⊡俏┐ 暉暨/暩偮ㄊ妒諙⇑ 佢┛ 墇咕⊡圍(사)ㄹ偯 GAS 妒諙彙罊厖忝励垮妒諙毘ㄽ她GHz揹瓘墠匚唅罊兢惛卻励客罊宪ㄹ励佢罊阶う傚夼剝情ㅁ丁ㅌㅛ懘彐咍旻復她ㄷ哑⇑ 挽掖┏ (ㅈ)ㄷㅉ(ㅈ)乙扮妒諙┆ 嗂彊嘜搿丁奠⇐⊡圍⇐奅回剃堳⇐嘐嬝厒嬝ピ奅攍揲⇐鱋mV嫽兢倶ナ宪ㄹ励佢罊│扁儉吹ㄱㅁ墇鱋mV咪妠デ剃岤垠她ㅌㅛㅛ⇑ 俏剪屘鱋mV—击⇐彊嘜搿丁奠捻♫罊勿墠■ Gy关ゴ啌呼鱋mV咪呖kPa叻掙罊呼妧嘐憺┥ 咕噔咕奅罊嫳┆ 呀挽傚剪屘懘彐mV奅侚墠罊ど嶙┐ 憇卿否噔咕叼哖罊彊嘜搿丁奠⇐鱋mV¯ ┓ 侚┛ 嗓兑堳分罊峩圍侧┛ 15,3凹罊惛寍惃慮┆ 儀呀罊傲关姵偯呖kPa丅墇劉唲剝儿罊嬓(有)┐ 匀密┓ 噤(ㅂ)儽罊凰徥呀懘彐峋懹Ⅴサ啌呼⇑ 暨0暩嘐憺圢ㅛ勿墠⇑伉【壨鱋mV咪—埆圢ㅛ仗偳否兑循勿墠她佢娘┐ 罊彐■ 儩圢ㅛ⇑ 扚傚奅回她敞奠罊挽掖┏ (ㅈ)ㄷㅉ(ㅈ)乙扮cm嘐嬝┥ 旻卻坎夕 /+0k j 她瓘墠妃嚶暻奅回敞媤傲壨 03. k j 瓘墠妃嚶嫊廖噎崭伪 1. k e罊凡扉嚃匷寍┛ (ㅈ)仞儀呀啾鹵 / ㄷ 3k j-f 嚃夕罊 ▌ nA▾ 号亂嘐憺兟埻她剝儿罊慶nA▾ ぇ懘卵奅⇑ 忾も鱋mV咪慮婺┥ 罊扚傚夼剝掖┆ ㄷ┣ 儀呀cm嘐嬝┥ 旻卻坎夕 /+0k j 她瓘墠妃嚶⇑ 暨1暩mV奅勿墠⇑ 嶙剪屘乙噭堜慆偁罊扚傚夼ㅌㅛ懷♪ㄱㄹcal牞優≒⊡♪罊匍岯┆ ㄷ┣ 乙扮┻ nm罊慄慮mV奅勴咦牞丞寞咾卵掃乙噭堜⇑奅回敞媤湊採【壨mV奅嬝卵掃罊A▾ 剝cm嘐嬝┥ 坎夕┆ ㄷ┏ 嘂(ㅌ)她吳弗瓘墠妃嚶罊匍岯┆ ㄷ┣ 乙扮罊【敞奅└ ラ嚓回囤μℓ掽ㄴ暻ㄱ厏丨宕嘜┆ ㄷ┣ 乙扮nmへmV奅⇑ 乏嶙奅回敞媤罊nA偁嗂扇侜叡× ⇑ 暨2暩宋寔史嘐嬝摯┐ 勿墠⇑ 嶙mV奅嬝吳噱囤夕mV奅罊牞奅回捭佺伉嘐嬝┐ 囤侚罊关嫳┆ 呀挽ㄴ壨寀嘐嬝厒嬝宋寔史嘐嬝摯傚奅唎↞奅回嫽懘彐囹掃⇑ 嶙夏◆ T? N罊nA偳否史嘐嬝+岤噷垮嚓⇑ 咤偳摽┥ (ㅂ)勿■ Gy懿峎侺埯宦【壨宋寔史嘐嬝摯⇑勿墠■ Gy慈ㄴ(ㅂ)瓘偁尥俍宋寔史嘐嬝摯罊敷嗂匈瓘墠妃嚶 /. +0. k j 嫊廖奅回nm倚ナ卵掃罊扇侜夂嗂罊峎侺咕叼卵掃乙噭堜⇑叡× 咽挽罊关傚剪屘她瓘一⊡凌懘彐俱ㄊ妒諙罊呼妧垮嚓回她ㄠ扉⇐搗嵓丁剃恍嫽罊ど嶙彊嘜搿丁奠捻♫ ⇐処塺ㅌㅛ击罊关も嗒垮嚓罊栒呶mV嘜⇑垮嚓┣ 儀呀nm動nA▾ 厏丨敺搗嚦恍⊞暨3暩敺峮嘐嬝厒嬝勿墠⇑(다)ㄴㄷ(ㅂ)瓘懘彐宋寔史嘐嬝摯┐ 她敺峮嘐嬝厒嬝罊┓ ╗ 僥nA峎卼ㄹ厒嬝咽挽卞ㅎ剪屘她嘐嬝敓啉㊦敺丟亅懹罊咤偳摽┥ 倶慘扉吳弗姲异噣└ /#MΩ乾健哓敓敖學圴回坎夕剪屘敺峮罊慄慮吳弗姲异噣囃匆ㄷ嘐嬝厒嬝㊦宋寔史嘐嬝摯俠⇑ 励ㅠ厒嬝nm罊唅噻俍囡奠罊【壨峊克任偯罊傚厒嬝囡奠懘彐┤ 偮呼妧罊傮ナ呖伉屑慡⇐mV奅嫽叡× nm罊舍嗒嬝憺媗♪ 勃呖峽丅罊數慄嘐叼哖、 瓘凅中罊兢┘ 嗂卞ㅎ┐┓ 鱋mV憺ピ啉罊 │扁冢ㄱㅁ劉唲⇑ 暨4暩敺摀勿墠⇑ ▾ 凋敺摀呀剪屘彐◇ (五)♪罊┆ 嗂敺摀 0. . k j⇑ ┳ ╗ 懇シ搫埬ㄱ˪嚦ㄷ厒嬝嘐嬝丁嘐仩挽傝崠mV夕剃岤垠她丅墇罊咤偳摽扃壨儀假岬嬝罊懘彐嗔叡× ㄟゴ密嘐仩ゲ嘐罊敺摀ㄟ侩撣┐ ⊡罊據瀆傸扉偁搯她라儿罊數嗂/. . ㄷ /3. k j罊挽掖仞ㄷッ儀呀┆ 嗂罊敺摀nm勾撣岬嬝┣ ㄷ┏ 乙扮⇑ 暨5暩処墠勿墠⇑ 伶┳ 剪屘傚崕慡夬夼她忒忱┓ ゲ乙罊—┻ 傚(ㅂ)勿■ Gy她ざ◑ 奠┓ 撣罊勍▾ 哌呋丅墇埔庬⇐匍凹⇐垂愝嫽┓ 嵑剝寋罊傚嗔罊勿墠■ Gy关傚ナ懘彐㊦呀夏傝罊密ナ忞徼夬夼她妠デ姬忱丁励ㅠ噤剛喚〕罊—冱ナ噤夔ざ処罊【剪屘咍媔哌她成μℓGHz揹┳ 六儩× ⇑

/,1 復傒匚唅

暨/暩勿墠均劂奠暺扃壨咤掂崕ㄹ她勿墠均劂奠怫呼掷㊡罊壮┗ ┣■ Gy忝冷┣ 宦剪屘ｂ掂咱挽傚勿墠儩× 她均劂媝奠兢懘彐寬μℓ忯♠⇑ 勿墠均劂奠乙┳ 揓兑均劂⇐均劂丁┓ 均劂 1┤ 唅ン⇑ 剖乙┳ /. . 乙罊ナ┤ 揓兑均劂呖 63 乙▾ ┐ 罊均劂呖 4. ㄷ 63 乙罊┓ 均劂呖 4. 乙▾ ┐ ⇑ 勿墠均劂奠; 暨揓兑均劂) 均劂暩-剖〕同(/ . . # ⇑

暨0暩鱋mV咪妠デ剃岤垠暨T? N暩ㄱㅁ瓘剝儿暺扃壨⇖(ㅂ)掂劉唲忴吡唅ン ⇗罊壯掂ピ┗ ┣■ Gy傚┣ 宦剪屘卻ㅌㅛ噤夔┆ 儀呀nmㄱㅁ瓘鱋mV咪妠デ剃岤垠暨T? N暩她剝儿懘彐忝冷丁忯♠罊ㅇㅇ匡ㄱㅁ瓘丁┓ ㄱㅁ瓘┣┤ 唅ン罊ㄱㅁ瓘壓; ㄱㅁ瓘-剖〕同(/ . . # ⇑

暨1暩彊嘐⇐鱋mV⇐処塺ㅌㅛㅛ剝儿暺傚嗟┣ 宦剪屘嘐慄嘐叟媮┆ 儀呀nm彊嘐⇐鱋mV⇐処塺她ㅌㅛㅛ剝儿⇑

/,2 寁忏偕侚墠

扃壨 QNQQ/ 6,. . 思● 傚咤嗂偳摽同鹵懘彐乙哑罊忏扉悚吗壨 v¤ q彙婗罊彐 r啌摽罊忏同悚吗壨奸乙嗟彙婗罊扃壨 v°啌摽罊冶 N暩. ,. 3 呀罊儳写咕寁忏偕劂┻ ⇑

2 结果

0,/ 勿墠均劂奠

復傒宦她勿墠均劂奠呜帡☞┛ 傚埡宦暨N暩. ,. 3暩罊徨彙 /⇑

彙 / ┣ 宦勿墠均劂奠她嗟慆暨I 罊# 暩

宦ㄴㄨ	l	摭兑均劂	均劂	┓ 均劂	均劂異
復傒宦	56	12	2.	2	72,67#
傚埡宦	56	04	17	/1	61,11#
v^0	-	-	-	-	3,125
N	-	-	-	-	. ,. 0/

0,0 鱸mV咪妠デ剃岤垠暨T？N瞈ㄉㄇ壛剝ル

傚嗺┣ 宦勢屘鱸mV咪妠デ剃岤垠暨T？N瞈她ㄉㄇ壛塺謺復傒宦她呉呜♫┛ 傚埡宦暨N瞥. ,. 3瞈謺徨彙 0⇑

彙 0 ┣ 宦勿墠均劂異她嗺慆暨l 謺# 瞈

宦ㄴㄨ	l	ㄉㄇ壛	┓ ㄉㄇ壛	ㄉㄇ壛塺
復傒宦	56	/	55	/,06#
傚埡宦	56	5	5/	6,75#
v^0	-	-	-	2,521
N	-	-	-	. ,. 07

0,1 彉嘐⇐鱸mV⇐処塺她ㄣㄣ丱

傚嗺┣ 宦勢屘慄嘐叟媮┆ 僦呀nm彉嘐⇐鱸mV⇐処塺她ㄣㄣ丱謺復傒宦她GHz揹匚唅呉呜☞┛ 傚埡宦暨N瞥. ,. 3瞈謺徨彙 1⇑

彙 1 ┣ 宦彉嘐⇐鱸mV⇐処塺ㄣㄣ丱她嗺慆Y暨 $\bar{x} \pm s$ 瞈[

组别	n	PH	$PaCO_2$	PaO_2	SO_2	心率	呼吸频率
观察组	78	7.41 ± 14.79	46.12 ± 13.56	88.41 ± 20.01	96.27 ± 5.26	90.68 ± 17.05	20.74 ± 2.85
对照组	78	7.35 ± 0.12	40.12 ± 14.85	75.78 ± 14.93	93.98 ± 5.22	96.54 ± 17.69	22.23 ± 2.51
x^2	/	/	2.635	4.468	2.729	2.106	3.465
t	/	/	0.009	0.000	0.007	0.037	0.001

3 讨论

伉┬ 六噤夔 GAS 扇失勢屘┤ 謺鱸mV咪妠デ剃岤垠暨T？N瞈她ㄉㄇ壛塺湊撣謺nA慬 7+02# 謺GAS 扇失勢屘她嗚┴ 唤〕冶┤ 謺缶奸ㄊ┻ ┏ ㈦)呖壯┛ 鱸mV咪妠デ剃岤垠傝崠她謺嗔夬夼她崠嗚塺撣慬 11+5/ #⇑ 勍▾ 謺臹咕$\mu\ell$墠⇐孤ン她ㄊ哑 GAS 扇失勢屘丁墇鱸mV咪妠デ剃岤垠她二⊡伶學謺kℓ呀ㄴ壨媔哌咕叼她勿墠卿否憳彐┬ 六兟揯謺動nA▾ ㄊ偳一傀 GAS 扇失勢屘丁墇鱸mV咪妠デ剃岤垠她ㄆ塺謺憳┆ 嗕ぇ憳┬ 六夔叼她厒(ㄈ)⇑冢ㄉㄇ鱸mV咪妠デ剃岤垠丁墇她伶學∞匡┣ 婃謺堂ゴ呖侠在剃崠夼串ぅ庾夼■ 她┓ 鱸mV憺謺ナ嗂呖ピ在剃來串懹♪她ㄣㄣ丱冢ㄉㄇ來串劉唲⇑ 勍▾ 謺伉密 GAS 扇失勢屘厒丨┬ 六噤夔她kℓ呀謺扃ㄉㄇ媔哌$\mu\ell$墠她勿墠兟揯二咕摭兑扇徥她劂┻ 謺勿墠■ Gy关密勢屘厒丨壛一⊡凌妒嚭⇐嘐憺圢丱勿墠⇐処墠夏傝⇐咪啉慄嘐勿墠嫽兟揯咘┤⇑ ㄴ壨孳寁丱她勿墠卿否謺ㄊ偳号亂勢屘她鱸mV剝ル謺一傀鱸mV咪妠デ剃岤垠她丁墇謺懇シ鱸mV价採⇐☎ザ嫽剝ル她丁墇謺傚厒撣┬ 六夔叼她劂┻ 扇側⇑

伉嗔嗂偳摽冶┤ 謺ㄴ壨侈冱夼剝妒嚭▾ ㊦儹徬謺nA▾ ㊦呀揯捨勃凉兴囆掃夼勸┤ 崠夼來串她ぅ庾謺竟吹ㄉㄇ僈勢屘ㄐ¯崠她写兑剝ル曞謬憺圢丱▾ ㊦ㄐ¯崠吤揖她勿墠nA▾ こ匷勢屘ㄐ¯崠她圢囉異謺捨嗒┛ 嗂卞伝ㄐ¯崠敓嫲謺慶峎侺懇シ丁墇ㄗ¯嚦⇐怗mV嫽┓ 嵑墇恥謺咕叼ぇ憳奅回她嫊廖丁卵丁暩孳寁丱勿墠兟揯nA▾ 啾鹵勢屘她鱸mV憺扃ㄉㄇ扚傚剃她勿墠兟揯謺峎侺寔匷侺鱸mV憺壹慄┘ 号亂ナ夼剝暩員ㄊ妒嚭壛一⊡凌⇐—冱帨ノ丨密nA▾ こ匷勢屘厹夕惋侺⇐优录她帨ノ謺恒捨丁墇帨ノ┓ 嵑她堳ル謺▾ 嗔一傀丁墇劉唲她啿塺謺慶峎侺嫳┆ 呀挽ㄉㄇ墇勢屘壛一⊡凌她写兑剝ル兢憳彐侚墠⇑ 嗔侠謺孳寁丱勿墠卿否慶峎侺咕叼懇シ侠懹凅中伶學謺ぇ憳勢屘僥吹刱侜慡⊡ゃ丹⇑

咤嗂偳摽┬ 徥傚 GAS 扇失勢屘扃壨孳寁丱勿墠她后⊡叼哖憳彐ㄊ哑謺偳摽家哖呜婗謺傚嗺┣ 宦勢屘她鱸mV咪妠デ剃岤垠暨T？N瞈她ㄉㄇ壛剝ル⇐慄嘐叟媮┆ 僦呀nm彉嘐⇐鱸mV⇐処塺她ㄣㄣ丱謺復傒宦呜帡☞┛ 傚埡宦謺彙婗孳寁丱勿墠峎侺咕叼一傀鱸mV咪妠デ剃岤她丁墇謺悅こ勢屘┬ 六噤夔她偮ダ剃謺kℓ呀慶峎侺号亂勢屘咪⊡GHz揹扇徥匚唅謺傚ナ僖吹刱侜ゃ丹咕扇徥她ぇ憳劂┻ ⇑ ㄣㄨ侠謺嗺慆┣ 宦勢屘傚┬ 六勿墠儩× 她均劂媝異謺復傒宦┼ 呉呜撣┛ 傚埡宦謺彙婗孳寁丱勿墠峎侺ㄊ偳厒(ㄈ)傚┬ 六儩× 她ざ◑ 謺尋嫐嵑俍丁恐她勿勢デ孳謺一傀(ㄐ)勢宇宜她ㄉㄇ壛謺厒撣勢屘傚┬ 六噤夔丁勿墠儩× 她ㄧ丨 ┃剃⇑

啾鹵┓ 憇偳摽家哖nA姬謺扃壨孳寁丱勿墠卿否傚 GAS 扇失勢屘憳彐┬ 六兟揯謺ナ┬ 六叼哖呜帡謺傚厒撣勢屘她勿墠均劂異⇐捻♫鱸mV咪妠デ剃岤垠ㄉㄇ壛塺⇐号亂彉嘐⇐鱸mV⇐処塺剝ル懿二咕湊俍她ぇ憳× 壨謺nA▾ ㄊ偳厒撣勢屘她壛一丁壛偊恺扉謺ぇ憳ナ僖吹丹侜謺nA▾ 伉┬ 六┤ 憳彐卽全关壨⇑

参考文献：

Y[冞崴巾,后⊡勿墠傚 GAS 扇失鱸mV咪妠デ剃岤垠ㄉㄇ壛她凅中YH,┤ 份佑= ▶ ┣ ㈦)壛*0. 0/*14&0'8'76+/77,

Y0[懻扊偤,扇失妒勿鱸mV頀嫙勢屘┤ 偳否寬$\mu\ell$勿墠傚鱸mV咪妠デ剃岤垠她揯捨叼哖YH,┤ 份(ㄐ)巡匚(ㄉ)*0. 0/*7&12'8'5. +/5/,