(Unplanned readmission to intensive care unit during the same hospitalization at a teaching hospital)

                    [1]   [1]   [1]   [2]   [1,3]   [1,4]

                CPI [1],   [2]   [3]   [4]

Dong-Hyun Song[1], Sun-Gyo Lee[1], Chul-Gyu Kim[1], Dong-Ju Choi[2], Sang-Il Lee[1,3], Su-Kil Park[1,4]
Clinical Performance Improvement Team[1], Information Management Department[2],
Asan Medical Center
Department of Preventive Medicine [3] & Internal Medicine[4], College of Medicine, University
of Ulsan

            :   ,   388-1   ,   Tel > 3010-3091
E-mail : skpark@amc.seoul.kr

        :

      : 138-736   2   388-1   CPI
Tel : 3010-3099
E-mail : dhsong92@amc.seoul.kr

(Unplanned readmission to intensive care unit during the same hospitalization at a teaching hospital)

Abstract

Background : Because unplanned readmissions to intensive care unit(ICU) might be related with undesirable patient outcomes, we investigated the pattern of and reason for unplanned ICU readmission to provide baseline data for reducing unplanned returns to ICU.

Methods : The subjects included all patients who readmitted to ICU during the same hospitalization at a tertiary referral hospital between January 1st and June 30th 2002. Quality improvement(QI) nurses collected the data through medical records and a medical director reviewed the data collected.

Results: 1) The average unplanned ICU readmission rate was 5.6% (gastroenterology 14.6%, pediatrics 12.7%, pulmonology 11.9%, neurology 8.9%, neurosurgery 6.3%, general surgery 5.3%, chest surgery 3.9%, and cardiology 3.3%). 2) Among the unplanned readmissions, more than 50% of cases were from patients older than 60 years, and the main categories of diagnoses at hospital admission were neurologic disease(29.9%) and cardiovascular disease(27.6%). 3) Of unplanned ICU readmissions, 41.8% had recurrence of the initial problems, 44.8% had occurrence of new problems, and 9.7% required postoperative care after unplanned operations. 4) The most common causes responsible for unplanned ICU readmission were respiratory problem(38.3%) and cardiovascular problem(14.3%). 5) About 40% of unplanned ICU readmission occurred within 3 days after ICU discharge. 6) Average length of stay of the readmitted patients to ICUs were much longer than that of non-readmitted patients. 7) Hospital mortality rate was much higher for unplanned ICU readmitted patients(23.6%) than for non-readmitted patients(1.5%) (P<0.001).

Conclusions : This study showed that the unplanned ICU readmitted patients had poor outcomes(high mortality and increased length of stay). In addition study results suggest that more attention should be paid to patients in ICU with poor respiratory function or elderly patients, and careful clinical decisions are required at discharge from ICU to general ward.

Key words : Unplanned ICU readmission

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Joint Commission on Accreditation of Healthcare
Organizations(JCAHO)

1986 (1, 3).

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본원에서는 2002년부터 임상지표 모니터링 시스템을 구축하였으며 이 중 동일 입원기간내 계획에
없던 재입실률 모니터링의 목적은 본원의 중환자실 재입실률을 측정하고 중환자실 재입실과 관련
된 원인과 예상가능한 위험 요인 및 사망률을 파악하

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중환자실 재입실 환자 리스트

No.	환자성명	등록번호	나이/성별	진료과	병동	주치의	전공의	입원일자	1차입실일	2차입실일
1	강 원	2 239	65/M	CS	038	훙	오	20021114	20021114	20021211
2	권 진	2 154	29/M	NS	036	전	이	20021001	20021007	20021216
3	김 영	2 901	1/F	PCS	033	서		20021204	20021206	20021218
4	김 만	2 697	41/M	CV	039	송		20021205	20021205	20021213
5	김 호	2 698	79/M	GS	031	고	형	20021206	20021206	20021212
6	박 희	2 923	52/M	NR	037	권	노	20021206	20021208	20021218
7	박 복	1 176	77/F	CV	039	송	오	20021209	20021209	20021213
8	박 순	1 335	72/M	CS	038	송		20021112	20021112	20021212
9	서 춘	2 569	35/M	ONC	034	최	박	20020921	20021130	20021213
10	신 전	2 133	73/M	GS	031	일반	이	20021124	20021125	20021214
11	인 순	2 023	66/M	NPH	035	박	박	20020902	20021203	20021219
12	이 숙	2 710	30/F	ONC	034	일반	김	20021112	20021128	20021218
13	이 화	2 165	67/M	CS	038	이	문	20021115	20021117	20021213
14	이 구	2 721	45/M	NS	036	유	이	20021203	20021203	20021210

<Figure 1> ICU readmitted patient list

Order communication system(OCS)

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" post operative care"

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$$\frac{(\qquad)}{\qquad} \times 100$$

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χ² test와 t-test를 사용하였다.

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                                                                3521   ,   315

            9. 0%   .   119 (37. 8%)   116

                                            3   T-cannula

    .   196 (62. 2%)   5. 6%

4. 3~7. 7%   . (P=0. 187) <   1>

<Table 1> ICU readmission rates

Month	1	2	3	4	5	6	Total	P
ICU discharge(n)	631	562	618	591	636	483	3521	-
total ICU readmission(n)	48	56	55	48	56	52	315	-
total ICU readmission rate(%)	7.6	10.0	8.9	8.1	8.8	10.8	9.0	-
unplanned ICU readmission(n)	27	35	34	31	32	37	196	-
unplanned ICU readmission rate(%)	4.3	6.2	5.5	5.2	5.0	7.7	5.6	0.187

2)

                                    5. 3%   6. 3%   3. 9%   3. 3%

            14. 6%   5. 2%   8. 9%   12. 7%

    (P<0. 01) <   2>.

<Table 2> Unplanned ICU readmission rate by clinical departments

	Clinical department	ICU discharge(n)	Unplanned ICU readmission(n)	Unplanned ICU readmission rate(%)	P value
Internal Medicine dept.	Gastroenterology	41	6	14.6	
	Pulmonology	126	15	11.9	
	Cardiology	629	21	3.3	
	Others	87	3	4.6	
	Subtotal	883	45	5.1	
Surgical dept.	Chest surgery	592	23	3.9	
	Pediatric cardiac surgery	257	8	3.1	<0.01
	General surgery	584	31	5.3	
	Neurosurgery	603	38	6.3	
	Others	256	8	3.1	
	Subtotal	2292	108	4.7	
Neurology		179	16	8.9	
Pediastrics		165	21	12.7	
Ohters*		-	6	-	
Total		3521	196	5.6	

*   1

2

                  196   2   22

        174   .   62. 7% ,   37. 3%   51. 42

      .   9   (14. 9%) , 50   (14. 9%) , 60   (52. 3%)   .

            29. 9%   (27. 6%) ,   (14. 9%) ,

    (13. 8%)   .   64. 4%

                            1   35. 6%

    (18. 4%)   (10. 3) ,   (6. 9%) ,   (5. 8%)   .

                              49. 4%   50. 6%

        .   1   156 (89. 6%)   2   15

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<Table 3> General characteristics of unplanned ICU readmitted patients

Characteristics			N	%
Sex	Male		109	62.7
	Female		65	37.3
Age (years)	0 ~ 9		26	14.9
	10 ~ 19		5	2.9
	20 ~ 29		6	3.5
	30 ~ 39		8	4.6
	40 ~ 49		12	6.9
	50 ~ 59		26	14.9
	Over 60		91	52.3
	Mean±SD		51.42±26.05	
Groups of diagnosis at hospital admission	respiratory disease		24	13.8
	cardiovascular disease		48	27.6
	hepatobiliary disease		15	8.6
	gastrointestinal disease		26	14.9
	neurologic disease		52	29.9
	others		9	5.2
Comorbid diseases	Number	None	112	64.4
		1	36	20.7
		2	12	6.9
		3	14	8.0
	classification	Diabetes Mellitus	18	10.3
		Hypertension	32	18.4
		renal failure	10	5.8
		liver disease	12	6.9
		neoplasm	5	2.9
		chronic lung disease	10	5.7
		cardiovascular disease	8	4.6
		cerebrovascular disease	7	4.0
Operation	Yes		86	49.4
	No		88	50.6
Times of ICU readmission	1		156	89.6
	2		15	8.6
	3		2	1.2
	4		1	0.6
Total			174	100

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1)

123 (62.8%), 64 (32.7%)

1 82 (41.8%), 1 87 (44.4%),

18 (9.7%) . < 4>

<Table 4> The factors and reasons of unplanned ICU readmission

Factors \ Reasons	Recurrence of the initial problem	Occurrence of the new problem	Post operative care	Others	Total
Clinical status factor	69(35.2)	52(25.5)	4(2.0)	-	123(62.8)
Care provider factor	13(6.6)	37(18.9)	14(7.1)	-	64(32.7)
Others	-	-	-	9(4.6)	9(4.6)
Total	82(41.8)	87(44.8)		9(4.6)	196(100)

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　　　　　　　　　　　　　　　　　　　　　　　　　　75 (38. 3%)

　　　　　　　　,　　　　　　　　　　　　　　　38 ,　　　　　　13 ,

10　　　　.　　　　　　　29 (14. 8%)　　.

　　　　　　　　　　　　　　.　　　　23 (11. 7%)

　　　　　.　　　　　　　　　　　　22 (11. 3%)　　.< 5>

<Table 5> The causes for unplanned ICU readmission

Factors \ Causes	Clinical status factor	Care provider factor	Others	Total(%)
Respiratory problem	**47**	**26**	**2**	**75(38.3)**
respiratory arrest	6	4		10
aspiration pneumonia	1	12		13
bacterial/viral pneumonia	4	3		7
ineffective respiratory pattern	34	2	2	38
ohters	2	5		7
Cardiovascular problem	**25**	**2**	**2**	**29(14.8)**
arrhythmia	7			7
cardiac arrest	3	1	1	5
others	15	1	1	17
Gastroenteral problem	**17**		**1**	**18(9.2)**
GI bleeding	11			11
hepatoencephalopathy	6			6
others			1	1
Neurologic problem	**17**	**6**		**23(11.7)**
Sepsis		**6**		**6(3.1)**
postop complication	**3**	**19**		**22(11.2)**
Ohters	14	5	4	23(11.7)
Total	123	64	9	196(100)

3)

　　　　　　　　1　36 (18. 4%), 2　29 (14. 8%), 3　31 (15. 8%)　　　3

　　96 (49%)　　　.　　　　　　　　　　　　　　　　1　　　　　　　　　　34

(17. 4%), 2　　21 (10. 7%), 3　　21 (10. 7%)　　3　　　　　　　　　　33. 8%

　　.　　4 ~7　40 (20. 4%), 8　　80 (40. 8%)　　.　　　　　　　　　1

　　13 (6. 6%)　　　　　　　　　　　　　　　3　　　　3

　　23. %　　.< 6>

<Table 6> ICU readmission interval and first ICU length of stay

First ICU LOS(days) / Interval of ICU readmission(days)	1	2~3	4~5	6~10	Over 11	total
1	13	4	6	7	6	36(18.4)
2~3	7	21	7	10	15	60(30.6)
4~5	4	6	4	3	11	29(14.8)
6~10	5	5	1	10	10	31(15.8)
Over 11	5	6	5	7	17	40(20.4)
Total	34(17.4)	42(21.4)	23(11.7)	37(18.9)	60(30.6)	196(100.0)

* LOS : Length of Stay

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60   .

7. 44   3. 99   (P<0. 001) .

11. 16

(P=. 007) .   58. 72 ,   23. 4%

21. 32 , 1. 5%   (P<0. 001) . <   7>

<Table 7> The comparison of outcomes between unplanned ICU readmitted patients and non-readmitted patients

		Unplanned ICU readmitted patients	Non-readmitted patients	χ^2 or t	P value
Sex	Male	109(62.7)	1876(61.3)	.120	.749
	Female	65(37.3)	1183(38.7)		
Age (years)	0 ~ 9	26(14.9)	354(11.6)	20.29	.002
	10 ~ 19	5(2.9)	86(2.8)		
	20 ~ 29	6(3.5)	149(4.9)		
	30 ~ 39	8(4.6)	237(7.7)		
	40 ~ 49	12(6.9)	443(14.3)		
	50 ~ 59	26(14.9)	597(19.5)		
	Over 60	91(52.3)	1193(39.0)		
	Mean±SD	51.42±26.03	48.37±22.73		
First ICU LOS (days)		7.43±11.00	3.99±8.66	6.309	<.0001
Second ICU LOS (days)		11.16±16.36	-		
Total hospital LOS(days)		58.72±54.34*	21.32±23.44	21.52	<.0001
No.of death (mortality rate,%)		41(23.6)	45(1.5)	289.41	<.0001

* missing frequency : 3

Ⅳ. 고찰

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5.6%   Cooper(7)   3.9~9.0%

Durbin(5)   4.6%, Chen(4)   4.79%   .

(38.3%)   (14.8%)

41.7%,   18%   Chen(4)   ,

Rogenberg(6), Russell(8), Snow(13)   .

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32.7%   44.4%

.   (13.0%)   38.3%

11.2%   . Durbin(5)

,   ,

Baigelman(14)   .

respiratory care   .

3   38.8%   . 3

76   3   45 (59.2%)

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Acute Physiologic and Chronic Health
Evaluation(APACHE) score   (15)

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30%   22~42%

(4,16).

(8,9,15,16).

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5% (18)

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25~40%(2),   GDP

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6 5.6% , 14.6% 12.7%

11.9% 8.9% 6.3% 5.3% .

60 52.3%

29.9% 27.6% 14.9%

13.8% . 41.8% , 44.8%

. 38.3%

14.3% 11.7% 11.2% . 40%

3 . 58.72 ,

23.4% 21.32 , 1.5% .

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38.8% .

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