Study on Performance Following Key Performance Indicators for Trauma Care : Khon Kaen Hospital 2000

WITAYA CHADBUNCHACHAI, MD*,
SUNUNTA SRIWIWAT, BSc, MN**,
SIRIKUL KULLEAB, BSc, MPA**,
SURACHAI SARANRITTICHAI, MD*,
JIRAWADEE CHUMSRI, BSc**,
PIYAPORN JAIKWANG, BSc**

Abstract

This study was conducted in 2000-2001 in order to improve the quality of trauma care by establishing the Key Performance Indicators (KPIs) as a guideline in providing trauma care service and to study the personnel's performance following 27 indexes of KPIs for trauma care in Khon Kaen Hospital. After the implementation of the KPIs by the method of participatory action research (PAR), the trauma preventable death rate was decreased to 1.3 per cent which was statistically different from the preventable death rate in 1997 (2.0%).

Key word : Key Performance Indicator, Preventable Death

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Trauma audit committee conducted the project of 'Trauma Audit for Hospital Care Improvement' between 1994-1995 and the project of 'The Comparative Study before and after the Revision of Trauma Audit Filter, 1997-1998' by adopting the methodology of participatory action research in running the project. The result revealed that the preventable death rate of trauma patients declined gradually.

The conceptual framework of the implementation was composed of many processes as follows:

1. Set the system of medical care quality assessment by using the trauma registry as the tool in

* Trauma and Critical Care Center,
** Department of Nurse, Khon Kaen Hospital, Khon Kaen 40000, Thailand.

collecting the data of trauma patients and using the TRISS methodology in computing the Ps (Probability of Survival) score and assessing the quality of hospital care by comparing the Ps score with the real outcome of treatment(1-16).

2. Set the audit system of pitfalls in medical care in dead cases (Medical audit) that will provide information of pitfall in trauma care(17-21).

3. Apply the result of audit to establish the trauma audit filter.

4. Incorporate the trauma audit filter in the implementation system.

5. Evaluate the outcome.

From previous implementation, problems occurred in 2 processes, namely the process of establishing audit filter and the process of incorporating the audit filter in the implementation system. The problem in the first process was the completeness of audit filter and the problem in the second process was the hardest problem to deal with because this process required the cooperation of the personnel concerned and the personnel's cooperation was the most significant factor of the final outcome.

Copes et al suggested that improving the process of the trauma audit filter usage by establishing Key Performance Indicators (KPIs) enhanced the efficiency of trauma care.

Performance Indicators mean data and statistics that reflects the quality of medical care process leading to the outcomes.

Performance management means the method that manages the personnel to comply with KPIs that is designed from the medical care process(22).

Objectives

1. Establish the Key Performance Indicators for trauma care in Major Injury Group in Khon Kaen Hospital.

2. Establish the Performance Management System for personnel in trauma management system to comply with KPIs.

Methodology

1. Preparation

1.1 KPIs establishment
- Set up KPIs establishment committee
- Hold a committee meeting
- Make KPIs and guideline base on KPIs establishment from Liverpool Trauma Department, NSW and Trauma Audit Filter of Khon Kaen Hospital 1995 and 1997 (annex1)
- Review the KPIs set and guideline by 3 experts
- Revise the KPIs as suggested by the experts
- Define threshold of each KPIs

1.2 Set up system for performance management
- Set up computer program for collecting data to link with the trauma registry program
- Set up a data collection team
- Set up an additional data collection form apart from the trauma registry
- Set up a summary form
- Train data collection team

2. Implementation
- Meeting the personnel to understand the concept, objective and the activity of the project
- Training personnel about the knowledge of trauma care
- Continuous education
  :- Morning report
  :- Mortality, morbidity conference
  :- Case conference
  :- X-ray conference
- Orientation of new personnel
- Management of system inadequacy by the method of hospital accreditation

3. Outcome study
- Inclusion criteria
  - All trauma admission
  - All trauma dead
- Exclusion criteria
  - Underlying patients
- Evaluation
  - Death rate by severity
  - Preventable death rate
  - Performance rate
  - Compare result with 1995 and 1998

4. Analysis and report

Duration

1. Preparation March - April 2000
2. Implementation May - June 2000
3. Outcome Study July - December 2000
4. Analysis January - June 2001

RESULTS

1. General information

From July to December 2000 (6 months), 8,984 traumatic patients came to the emergency department, 2,747 patients were admitted and 127 died.

Comparing the 6 months' data of the years 1994, 1995 and 1998, it was found that ER and admitted

patients had increased but the deaths had decreased. (Table 1)

2. Trauma Audit Committee Dead Case Peer Review

It was found that the preventable death rate in the year 2000 was 1.3 per cent that was statistically significantly different from 1994, 1995 and 1998. (Table 2)

3. Pitfalls in the management of traumatic patients

From the Trauma Audit Committee Dead Case Peer Review, it was found that in the year 2000, there were 156 pitfalls, 88 of which contributed to death. (Table 3)

4. Performance rate (Table 4)

DISCUSSION

1. This study has 2 main purposes, i.e. :-

1.1. Set up KPIs for trauma care and implement the KPIs in the process of treatment, then evaluate the quality of care and compare the results with 1994, 1995 and 1998

1.2. Set up the performance management system in order to encourage the personnel to understand and keep in mind the KPIs during their routine practice. The performance of each KPI was then analyzed, evaluated and fed back.

2. Establishing the KPIs for trauma care is a major step in improving the quality of care. The process of trauma care is complex. It needs skill-good attitude, team work, good system and well-equipped facilities. Deficiency in any of the above mentioned factors will result in an unsatisfactory.

In order to improve the quality of care, all the related factors have to be considered. The important strategy to improve the outcome is to analyse and evaluate the process by using audit filter, outcome review and peer review. Problems and errors found will lead to correcting these defects and result in a much better outcome.

The next step to improve the quality of care is to set up KIPs which will be the indicators that show performance of the personnel in the important quality process of the care.

In order to reduce the preventable death rate, every responsible department has to analyze the complications and efficiency in trauma care by using trauma audit, audit filter and analyze the performance indicators.

In this study each KPIs was set up by analyzing the major process of care which had a major effect on the patient and using this information to set up the indicator. The authors used the concept of advance trauma life support from the ACS to plan the step approach for trauma care and modify the audit filter from 1994 and 1997 and also modify from the KPIs of Liverpool Hospital, NSW(22).

After the implementation it was found that there was much reduction in the preventable death rate from that of 1994 and 1997 which was statistically significant.

Table 1. Number of traumatic patients at Khon Kaen Hospital.

	No	Admit	Dead
July - December 1994	8,578	2,732	217
March - August 1995	7,967	2,492	206
September 1997 - February 1998	6,953	2,233	165
July - December 2000	8,984	2,747	127

Table 2. Mortality rate assessed by Trauma Audit Committee.

Type	Non Preventable			Potentially preventable			Preventable			Total		
	No	Dead	%	No	Dead	%	No	Dead	%	No	Dead	%
2537	89	76	85.4	75	59	87.7	2,546	82	3.2	2,710	217	8.0
2538	113	94	83.2	62	50	80.6	2,317	62	2.7	2,492	206	8.2
2540	106	99	93.3	35	23	65.7	2,091	42	2.0	2,232	164	7.3
2543	110	78	70.9	42	14	33.3	2,595	35	1.3*	2,747	127	4.6

* Statistically significant

Table 3. Pitfalls in the management of trauma patients.

Year	Station	Type of Pitfall					
		Delay Dx No/C*	Error Dx No/C*	Error Rx No/C*	Error technique No/C*	System inadequacy No/C*	Total No/C*
1994	Pre-hospital	2/2	4/4	81/51	-	25/4	112/61
	ER	1/1	1/-	14/3	2/-	24/2	42/6
	Trauma Ward	7/7	18/9	93/80	-	79/51	197/147
	OR	-	-	-	10/10	3/3	13/13
	ICU	-	-	28/24	-	1/-	29/24
	Orthopedic	-	1/1	6/6	-	7/7	14/14
	Total	10/10	24/14	222/164	12/10	139/67	407/265
1995	Pre-hospital	4/3	1/1	50/33	-	20/-	75/37
	ER	1/1	1/1	8/6	1/-	4/-	15/8
	Trauma Ward	8/5	6/5	100/84	6/4	60/46	180/144
	OR	-	-	-	12/11	5/4	17/15
	ICU	-	-	14/13	-	-	14/13
	Orthopedic	-	-	-	-	-	-
	Total	13/9	8/7	172/136	19/15	89/50	301/217**
1997	Pre-hospital	2/1	2/2	7/3	-	24/-	35/6
	ER	-	1/-	4/2	-	2/-	7/2
	Trauma Ward	4/3	4/3	55/35	2/1	35/24	100/66
	OR	-	-	-	6/4	2/1	8/5
	ICU	-	-	6/5	-	3/1	9/6
	Orthopedic	-	-	1/1	-	1/-	2/1
	Total	6/4	7/5	73/46	8/5	67/26	161/86**
2000	Pre-hospital	1/-	4/1	17/6	4/2	2/-	28/9
	ER	-/-	3/1	13/6	-/-	2/-	18/7
	Trauma Ward	2/-	4/1	44/34	2/2	9/3	61/40
	OR	-/-	-/-	4/4	11/9	3/1	18/14
	ICU	-/-	-/-	13/11	1/1	3/-	17/12
	Orthopedic	-/-	1/-	11/6	-/-	2/-	14/6
	Total	3/-	12/3	102/67	18/14	21/4	156/88**

* C = Contributed to mortality

3. Key success of this project was not only in the phase of setting up the KPIs but in the phase of making all the personnel understand the purpose and their willingness to practice the KPIs.

Peer review of the trauma death and feed back to the personnel about the problem-error and compliance of the KPIs were important to stimulate the improvement of the personnels' behaviors.

However, each KPI had no equal weigh in reducing mortality, and morbidity such as no intubation for patients with GCS < 9 which may be more harmful than patients who had blunt injury above the clavicle but did not have a cervical collar. The number of patients applied to each indicator is not large enough to analyze which KPIs are most critically important or which are less. This requires more time to collect data for analysis.

SUMMARY

Trauma and Critical Care Center, Khon Kaen Regional Hospital set up 'The Performance Indicators and Performance Management for Trauma Care Project' in order to enable all trauma patients to receive the same standard of treatment.

From the result of implementation, it was found that the quality of trauma care has improved and the rate of preventable death has decreased.

Table 4. Rate of performance of personnel for each KPI.

KPI	Number of PT to whom this indicator applied	Yes	%	Threshold %
1. In ER > 2 h	2,638	55	2.1	0
2. Exceed 2000 ml (V) without blood	79	42	53.2	20
3. Explore penetrating wound > 1 h of arrival	65	33	50.8	20
4. Spend time for CT > 1 h	108	29	26.9	20
5. GCS < 13 no CT with in 4 h	458	57	12.4	10
6. GCS < 9 intubution within 10 min	105	97	92.4	100
7. Multiple injury no CXR	283	52	18.4	20
8. Blunt injury above clavicle no C-spine XR	723	224	31.0	20
9. Blunt injury above clavicle no collar	674	190	28.2	20
10. Multiple injury no O_2	278	11	4.0	0
11. Represent in ER within 72 h	2,683	11	0.4	0
12. Missed fracture	1,428	6	0.4	0
13. Hypothermia	2,681	2	0.1	0
14. Fracture fixation within 48 h of arrival	950	791	83.7	80
15. Compound fracture fixation within 8 h	439	117	26.7	80
16. Non therapeutic laparotomy	107	3	2.8	20
17. Time to craniotomy				
< 2 h	144	3	2.1	
2-4 h	144	23	16.0	80
> 4 h	144	118	81.9	
18. Jt dislocation Rx > 4 h	56	12	21.4	80
19. Laparotomy in PT with BP < 90 in 60 min	32	7	21.9	80
20. Time to laparotomy				
< 2 h	144	49	43.0	
2-4 h	144	27	23.7	80
> 4 h	144	38	33.3	
21. Rx ischemic limb in 4 h	6	2	33.3	80
22. Unplanned return to OR	641	19	3.0	5
23. Unplanned return to ICU	48	2	4.2	5
24. Hct < 25% during admission	2,603	15	5.8	10
25. Document T in OR	1,612	1	0.1	80
26. All injury Dx in 24 h	2,671	2,620	98.1	99
27. Complication	2,683	267	10.0	10

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วิทยา ชาติบัญชาชัย, พบ, สุรชัย สราญฤทธิชัย, พบ*, สุนันทา ศรีวิวัฒน์, พยบ, พยม**, จิราวดี ชุมศรี, พยบ**, ศริริกุล กุลเลียบ, พยบ, พบม**, ปิยาพร ใจกว้าง, พยบ***

คณะผู้วิจัยได้จัดทำโครงการนี้ในระหว่างปี 2543-2544 โดยมีวัตถุประสงค์เพื่อพัฒนาคุณภาพการรักษาผู้ป่วยอุบัติเหตุ โดยการสร้างตัวชี้วัดคุณภาพให้เป็นแนวทางในการบริการผู้ป่วยและเพื่อศึกษาการปฏิบัติตามตัวชี้วัด 27 ข้อที่จัดทำขึ้นของบุคลากรที่ดูแลผู้ป่วยอุบัติเหตุ ภายหลังจากที่นำตัวชี้วัดที่จัดทำขึ้นมาใช้ในกระบวนการรักษาพยาบาล โดยใช้กระบวนการของการวิจัยแบบมีส่วนร่วม (Participatory Action Research) ปรากฏว่าอัตราการเสียชีวิตที่สามารถหลีกเลี่ยงได้ลดลงเหลือ 1.3% ซึ่งแตกต่างกันอย่างมีนัยสำคัญทางสถิติจากอัตราการเสียชีวิตที่หลีกเลี่ยงได้ในปี 2543 (2.0%)

คำสำคัญ : ตัวชี้วัดกระบวนการคุณภาพ, การเสียชีวิตที่หลีกเลี่ยงได้

วิทยา ชาติบัญชาชัย, สุรชัย สราญฤทธิชัย, สุนันทา ศรีวิวัฒน์, จิราวดี ชุมศรี, ศริริกุล กุลเลียบ, ปิยาพร ใจกว้าง
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* ศูนย์อุบัติเหตุและวิกฤตบำบัด,
** กลุ่มงานการพยาบาล, โรงพยาบาลขอนแก่น, ขอนแก่น 40000