

??? Zero Nosocomial Infection???

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SPECIAL ARTICLES

INCIDENCE OF ADVERSE EVENTS AND NEGLIGENCE IN HOSPITALIZED PATIENTS

Results of the Harvard Medical Practice Study I

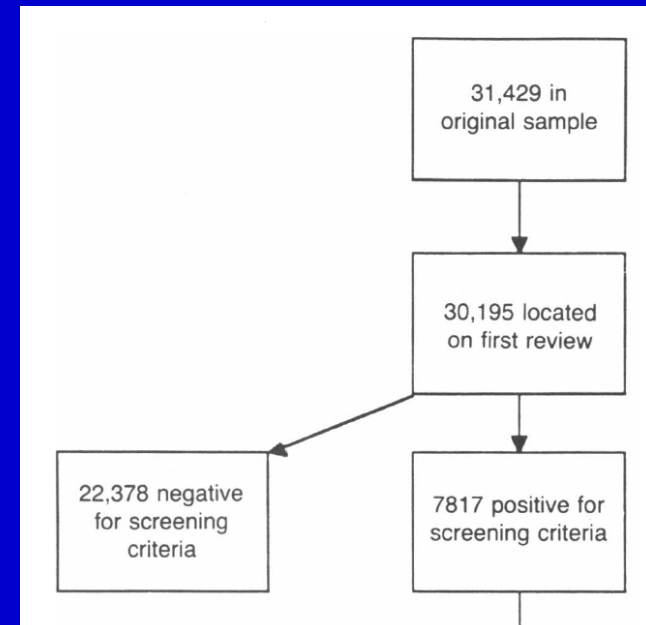
TROYEN A. BRENNAN, M.P.H., M.D., J.D., LUCIAN L. LEAPE, M.D., NAN M. LAIRD, PH.D.,
LIESI HEBERT, SC.D., A. RUSSELL LOCALIO, J.D., M.S., M.P.H., ANN G. LAWTHERS, SC.D.,
JOSEPH P. NEWHOUSE, PH.D., PAUL C. WEILER, LL.M., AND HOWARD H. HIATT, M.D.

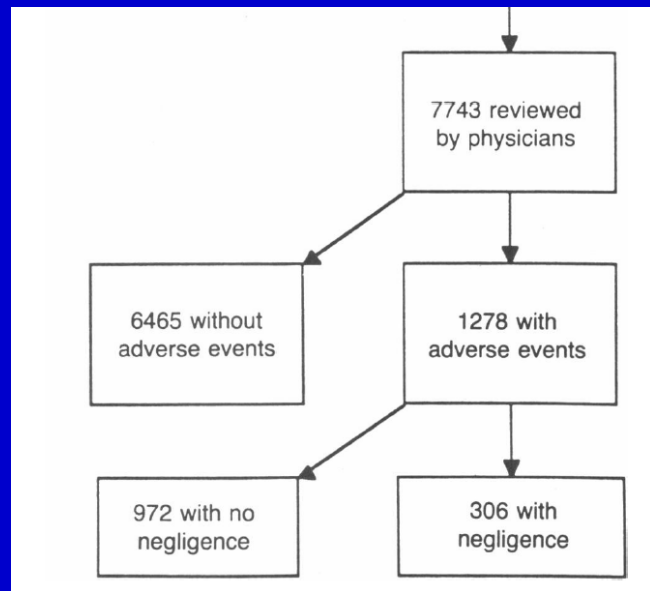
A study of 31,429 records of hospitalized patients from a population of 2,671,863 nonpsychiatric patients discharged from nonfederal acute care hospitals in New York in 1984.

Definitions

Adverse event = an injury that was caused by medical management (rather than the underlying disease) and that prolonged the hospitalization, produced a disability at the time of discharge, or both.

Negligence = care that fell below the standard expected of physicians in their community.





Adverse event = 3.7% (95% CI.= 3.2-4.2%)
Negligence = 1% (95% CI.= 0.8-1.2%)

We calculated that of the 2,671,863 patients discharged from acute care hospitals in New York State in 1984, there were 98,609 adverse events and 27,179 adverse events due to negligence.

CATEGORY OF DISABILITY	ADVERSE EVENTS	ADVERSE EVENTS DUE TO NEGLIGENCE
		<i>number (percent)</i>
Death	13,451 (13.6±1.7)	6,895 (25.4±4.2)

Incidence and types of preventable adverse events in elderly patients: population based review of medical records

Eric J Thomas, Troyen A Brennan

BMJ 2000;320:741-4

Patients aged ≥ 65 years

	Unweighted No of events*	Weighted events†	
		No of events	Incidence (% (SE))
All adverse events	207	7419	5.29 (0.37)
Preventable adverse events	117	4134	2.95 (0.28)

An adverse event was considered preventable if it was avoidable by any means currently available unless that means was not considered standard care.

TO ERR IS HUMAN

Building a Safer Health System

Linda T. Kohn, Janet M. Corrigan, and
Molla S. Donaldson, *Editors*

Committee on Quality of Health Care in America

INSTITUTE OF MEDICINE

When extrapolated to the over 33.6 million admissions to U.S. hospitals in 1997, the results of the studies imply that 44,000 – 98,000 Americans die each year as a result of medical errors.

More people die in a given year as a result of medical errors than from motor vehicle accidents (43,458), breast cancer (42,297), or AIDS (16,516).

Nosocomial Infections

Mortality-How much?

1. คนไทยติดเชื้อจากโรงพยาบาล
ประมาณปีละ

1. 4000 คน
2. 40000 คน
3. 400000 คน

2. คนไทยตายจากโรคติดเชื้อ
โรงพยาบาลประมาณปีละ

1. 2500 คน
2. 25000 คน
3. 250000 คน

3. คนไทยตายจากโรคติดเชื้อใน โรงพยาบาลมากกว่าตายจากอุบัติเหตุ

- 1.จริง
2. ไม่จริง

4. คนไทยติดเชื้อจากโรงพยาบาล มากกว่าติดเชื้อโรคไขเลือดออก

- 1.จริง
2. ไม่จริง

Prevalence and Impacts of Nosocomial Infection in Thailand 2001

Somwang Danchaivijitr MD*, Chertsak Dhiraputra MD**,
Somporn Santiprasitkul MSc***, Tepnimitr Judaeng MNS***

J Med Assoc Thai 2005; 88 (Suppl 10): S1-9

42 hospitals
Point prevalence survey
March 2001
18,456 patients.

Table 1. Demographic data and the point prevalence rate of NI

Data	Categories of hospitals				Average
	U(1)	R(2)	P(3)	O(4)	
Average(%)	7.3	6.5	4.9	6.9	6.4

The number of admissions in Thailand is ~6.2 million. With a prevalence rate of 6.4%, the estimated number of nosocomial cases was 396,800 cases in Year 2001.

1. คนไทยติดเชื้อจากโรงพยาบาล
ประมาณปีละ

1. 4000 คน
2. 40000 คน
3. 400000 คน

Top ten morbidity rate of diseases under surveillance Thailand, 2001 (2544)

Rank	Diseases	Cases	Deaths	Morbidity Rate
				(Per 100,000 Pop.)
1	Acute diarrhoea	1020377	176	1643.3
2	Pyrexia of unknown origin	269740	54	434.4
3	Dengue haemorrhagic fever	139355	245	224.4
4	Food poisoning	138795	2	223.5
5	Pneumonia	135768	1057	218.6
6	Haemorrhagic conjunctivitis	107929	0	173.8
7	Influenza Chickenpox	42371	1	68.2
8	Dysentery	37601	2	60.6
9	Malaria	34925	81	56.2
10	Chickenpox	31707	1	51.1

4. คนไทยติดเชื้อจากโรงพยาบาล
มากกว่าติดเชื้อโรคไขเลือดออก

1. จริง
2. ไม่จริง

Ref.: Annual Epidemiological Surveillance Report 2001, MOPH

Table 14. Mortality in patients with N.I.

	U	Categories of hospitals			Average
		R	P	O	
No. patients with NI	392	449	222	290	383
Mortality(%)					
Due to NI	4.1	7.6	10.4	6.2	6.7
Due to NI and other causes	3.1	2.0	1.4	5.5	3.0
Due to other causes	4.3	3.8	5.4	3.1	4.1
Total	11.5	13.4	17.2	14.8	14.1

The number of admissions in Thailand is ~6.2 million. With a prevalence rate of 6.4%, the estimated number of nosocomial cases was 396,800 cases with 26,586 deaths attributable to these infections in Year 2001.

2. คนไทยตายจากโรคติดเชื้อ โรงพยาบาลประมาณปีละ

1. 2500 คน
2. 25000 คน
3. 250000 คน

Top ten mortality rate of diseases under surveillance Thailand, 2002 (2545)

Rank	Diseases	Cases	Deaths	Mortality Rate
				(Per 100,000 Pop.)
1	Pneumonia	135768	1057	1.7
2	Tuberculosis	30033	287	0.46
3	Dengue haemorrhagic fever	139355	245	0.39
4	Suicide by liquid substance	5241	224	0.36
5	Acute diarrhoea	1020377	176	0.28
6	Leptospirosis	10217	171	0.28
7	Malaria	34925	81	0.13
8	Pyrexia of unknown origin	269740	54	0.09
9	Rabies	37	37	0.06
10	Encephalitis - total	430	30	0.05

Ref.: Annual Epidemiological Surveillance Report 2001, MOPH

Year	Population	No. of accidents (cases)	Deaths	
			No. (persons)	Rate per 100,000 pop.
1999	61,577,827	67,800	12,040	19.55
2000	61,770,259	73,737	11,988	19.41
2001	62,093,855	77,616	11,652	18.76
2002	62,554,482	91,623	13,116	20.97

Numbers and Rates of Accidental Deaths and Injuries Thailand, 1984-2002. Wibulpolprasert Thailand Health Profile 2001-2004. http://www.moph.go.th/ops/health_48

3. คนไทยตายจากโรคติดเชื้อในโรงพยาบาลมากกว่าตายจากอุบัติเหตุ

1.จริง

2. ไม่จริง

The Hazards of Hospitalization

ELIHU M. SCHIMMEL, M.D., *West Haven, Connecticut*

5. เราสามารถลดการติดเชื้อจากโรงพยาบาลได้

1.จริง

2. ไม่จริง

The logo features the text "100k" in a large, bold, white sans-serif font, with "lives" in a smaller, white, cursive script font below it. The text is centered within a dark blue square background. A thin white crosshair is overlaid on the text, with the vertical line passing through the "1" and "0" of "100k", and the horizontal line passing through the "0" and "k" of "100k".

100k
lives

An Overview of the 100,000 Lives Campaign

Joe McCannon
Vice President and 100,000 Lives Campaign Manager
Institute for Healthcare Improvement

November 15, 2006

Some Is Not a Number... Soon Is Not a
Time

A smaller version of the "100k lives" logo, featuring the text "100k" in a bold, white sans-serif font and "lives" in a white, cursive script font, set against a dark blue square background with a white crosshair.

100k
lives

The Number:

100,000 Lives

The Time:

June 14, 2006 – 9 a.m. ET

Campaign Objectives

- Save 100,000 Lives
- Enroll more than 2,000 hospitals in the initiative
- Build a reusable national infrastructure for change
- *Complete implementation of the 6 Campaign interventions in participating hospitals by January 2007.*
- *Focus on spread and sustainability.*

Six Changes That Save Lives

- **Deployment of Rapid Response Teams**...at the first sign of patient decline
- **Delivery of Reliable, Evidence-Based Care for Acute Myocardial Infarction**...to prevent deaths from heart attack
- **Prevention of Adverse Drug Events (ADEs)**...by implementing medication reconciliation
- **Prevention of Central Line Infections**...by implementing a series of interdependent, scientifically grounded steps called the “Central Line Bundle”
- **Prevention of Surgical Site Infections**...by reliably delivering the correct perioperative antibiotics at the proper time and taking several other associated actions
- **Prevention of Ventilator-Associated Pneumonia**...by implementing a series of interdependent, scientifically grounded steps called the “Ventilator Bundle”



The 100k Lives Campaign Scorecard

- **Over 3,100 Hospitals Enrolled**
 - Over 78% of all discharges
 - Over 78% of all acute care beds
- **Participation in Campaign Interventions:**
 - Rapid Response Teams: 60%
 - AMI Care Reliability: 77%
 - Medication Reconciliation: 73%
 - Surgical Site Infection Bundles: 72%
 - Ventilator Bundles: 67%
 - Central Venous Line Bundles: 65%
 - All six: 39%
- **Over 85% of Participating Hospitals Are Sending IHI Mortality Data**

Did Needless Deaths Fall?

122,342
Lives Saved

Home > Volume 332, Number 7553 > BMJ 332: 1328 doi: 10.1136/bmj.332.7553.1328 (Published 1 June 2006)

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BMJ 332: 1328 doi: 10.1136/bmj.332.7553.1328 (Published 1 June 2006)

[Analysis and Comment](#)

Quality improvement

Saving 100 000 lives in US hospitals

C Joseph McCannon (jmccannon@ihi.org), 100 000 Lives Campaign manager¹, **Marie W Schall**, director¹, **David R Calkins**, senior fellow¹, **Alexander G Nazem**, 100 000 Lives Campaign national field manager¹

Author Affiliations

Correspondence to: C J McCannon

An initiative to cut avoidable deaths required rapid recruitment

EDITORIAL

Hospital-Caused Deaths

Published: July 5, 2006

The results may seem hard to believe, but if the so-called 100,000 Lives Campaign has prevented even half of the needless hospital deaths it is claiming, the medical system is becoming a whole lot safer for patients.

A 1999 report from the Institute of Medicine of the National Academy of Sciences estimated that up to 98,000 Americans die needlessly each year because of medical errors in the nation's hospitals. That provoked a flurry of reform efforts, including a

SIGN IN TO E-MAIL THIS

PRINT

SAVE

THE TREE OF LIFE SUMMER

Additional Campaign Status

- Related campaigns forming nationally and globally (Canada, Australia, Sweden, Denmark)
- Changes in standard of care in participating facilities (over 25 hospitals going a year without a VAP)

Sources of Optimism: Hospitals with No VAP for One Year

1. Baptist Memorial Hospital Golden Triangle – Columbus, MS
2. Bay Regional Medical Center – Bay City, MI
3. BryanLGH Medical Center – Lincoln, NE [no VAP as of 3/2/06]
4. Caruya Baptist Memorial DeSoto – Southaven, MS
5. Medical Center – Ithaca, NY
6. Columbus Regional Hospital – Columbus, IN
7. Community Hospital Anderson – Indianapolis, IN [one unit has not had a VAP in two years]
8. Community Hospital East – Indianapolis, IN [one ICU went 25 months with no VAP]
9. Dominican Hospital – Santa Cruz, CA [no VAP since 10/12/04]
10. Geneva General Hospital – Geneva, NY
11. McLeod Regional Medical Center – Florence, SC [ICU has gone 21 months as of April without a VAP]
12. Memorial Hermann Texas Medical Center – Houston, TX
13. Oconee Memorial Hospital – Seneca, SC
14. OSF Saint Francis Medical Center – Peoria, IL
15. Overlake Hospital Medical Center – Bellevue, WA
16. Palmetto Health Baptist – Columbia, SC
17. Passavant Area Hospital – Jacksonville, IL
18. Providence Milwaukie Hospital – Milwaukie, OR [no VAP since February 2004]
19. Ridgeview Medical Center – Waconia, MN [no VAP in 2.5 years]
20. Sentara Leigh Hospital – Norfolk, VA
21. Sentara Norfolk General Hospital – Norfolk, VA [one unit has not had a VAP in over two years]
22. Sentara Williamsburg Community Hospital – Williamsburg, VA
23. St. Luke's Hospital East – Ft. Thomas, Kentucky
24. St. Luke's Hospital West – Florence, Kentucky
25. University of Rochester Medical Center/Strong Memorial Hospital – Rochester, NY
26. Upper Chesapeake Medical Center – Bel Air, MD

Sources of Optimism:
Hospitals with No VAP for One Year

1. Capitol Region Medical Center – Jefferson City, MO
2. Cooley Dickinson Hospital – Northampton, MA
3. Community Hospital East – Indianapolis, IN
4. Community Hospital Anderson – Anderson, IN
5. East Alabama Medical Center – Opelika, AL
6. Immanuel St. Josephs, Mayo Health System – Mankato, MN
7. Indiana Heart Hospital – Indianapolis, IN
8. Overlake – Bellevue, WA
9. Passavant Area Hospital – Jacksonville, IL
10. South Shore Hospital – South Weymouth, MA
11. Southwestern Vermont – Bennington, VT

Sources of Optimism

- Pronovost Report from 70 Hospitals Working on Central Line Infections:
 - 1,578 lives saved
 - 81,020 hospital days saved
 - Over \$165,000,000 in costs averted

Source: Peter Pronovost, Keystone ICU Project

The Next Campaign



We are asking hospitals participating in the Campaign to prevent five million incidents of medical harm over the next two years.



**The 5 Million Lives Campaign:
“Preventing Central Line
Infections with
the Central Line Bundle”**

Institute for Healthcare Improvement

Central Line Bundle Elements

1. Hand hygiene
2. Maximal barrier precautions
3. Chlorhexidine skin antisepsis
4. Optimal catheter site selection, with avoidance of using the femoral vein for central venous access in adult patients
5. Daily review of line necessity with prompt removal of unnecessary lines

Table 1. Comparing MSB with less stringent techniques for central venous catheter infection

Reference	Setting	MSB study design	No. of catheters		Main results	Additional results
			MSB	Control		
Raad et al 1994 ¹⁵	Ambulatory oncology clinic	Randomized trial	176	167	Catheter-colonization: 12/167 in control 4/176 in MSB RR = 0.32, 95% CI 0.10-0.96, P = .04 CR-BSI: 6/167 in control 1/176 in MSB RR = 0.16, 95% CI 0.02-1.30, P = .06	Colonization rates¹: 1/1000 in control and 0.3/1000 in MSB (P = .007) CR-BSI rates¹: 0.5/1000 in control and 0.08/1000 in MSB (P = .02)

Raad II et al. Prevention of central venous catheter-related infections by using maximal sterile barrier precautions during insertion. Infect Control Hosp Epidemiol 1994;15(Pt 1):231-8.

Maximal sterile barrier

includes the use of a cap, mask, sterile gown, sterile gloves, and a large sterile sheet, for the insertion of CVCs or guidewire exchange. Maximal sterile barrier precautions substantially reduces the incidence of CRBSI compared with standard precautions (e.g., sterile gloves and small drapes) Category IA Suggestion.

CDC .Guidelines for the Prevention of Intravascular Catheter-Related Infections MMWR 2002;51(RR10):1-28



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An Intervention to Decrease Catheter-Related Bloodstream Infections in the ICU

Peter Pronovost, M.D., Ph.D., Dale Needham, M.D., Ph.D., Sean Berenholtz, M.D., David Sinopoli, M.P.H., M.B.A., Haitao Chu, M.D., Ph.D., Sara Cosgrove, M.D., Bryan Sexton, Ph.D., Robert Hyzy, M.D., Robert Welsh, M.D., Gary Roth, M.D., Joseph Bander, M.D., John Kepros, M.D., and Christine Goeschel, R.N., M.P.A.

- Collaboration กับ 103 ICU ของ รพ. ต่าง ๆ ในรัฐ Michigan
- Daily goals sheet
สื่อสารและตรวจสอบ goal ของการดูแลผู้ป่วยทุกวัน ทุกเวร
มีการอภิปรายว่า catheter ยังมีความจำเป็นอยู่หรือไม่? ทุกครั้งที่มีการ round ward
- มี team leader และประชุมกัน สัปดาห์เว้นสัปดาห์
- มีรถเข็นที่มีของพร้อมเวลาแทง catheter

- มี check list
- ถ้าไม่ใช่กรณีฉุกเฉิน พยาบาลสามารถให้หยุดหัตถการได้ ถ้าทำไม่ถูกต้องตาม check list
- รายงานถูกส่งไปให้ CEO ของทุกโรงพยาบาลทุกเดือน
- มีประชุมรวมทั้งรัฐทุก 6 เดือน

“a checklist was used to ensure adherence to infection-control practices, providers were stopped (in nonemergency situations) if these practices were not being followed, the removal of catheters was discussed at daily rounds”

Study Period	No. of ICUs	Overall
Baseline	55	2.7 (0.6–4.8)
During implementation	96	1.6 (0–4.4)†
After implementation		
0–3 mo	96	0 (0–3.0)†
4–6 mo	96	0 (0–2.7)†
7–9 mo	95	0 (0–2.1)†
10–12 mo	90	0 (0–1.9)†
13–15 mo	85	0 (0–1.6)†
16–18 mo	70	0 (0–2.4)†

BMJ

RESEARCH

Sustaining reductions in catheter related bloodstream infections in Michigan intensive care units: observational study

Peter J Pronovost, professor,¹ Christine A Goeschel, director, patient safety and quality initiatives,¹ Elizabeth Colantuoni, assistant professor,¹ Sam Watson, senior vice president, patient safety and quality,² Lisa H Lubomski, assistant professor,¹ Sean M Berenholtz, associate professor,¹ David A Thompson, assistant professor,¹ David J Sinopoli, instructor,³ Sara Cosgrove, assistant professor,⁴ J Bryan Sexton, associate professor,¹ Jill A Marsteller, assistant professor,⁵ Robert C Hyzy, associate professor,⁶ Robert Welsh, chief,⁷ Patricia Posa, special project coordinator,⁸ Kathy Schumacher, director, quality, safety, standards and outcomes,⁹ Dale Needham, assistant professor¹⁰

BMJ 2010;340:c309 doi:10.1136/bmj.c309

Study period	No of ICUs	Median (IQR) No of infections
After implementation—sustainability period:		
19-21 months	89	0 (0-1)
22-24 months	89	0 (0-1)
25-27 months	88	0 (0-1)
28-30 months	90	0 (0-1)
31-33 months	88	0 (0-1)
34-36 months	85	0 (0-1)

- Pronovost Report from 70 Hospitals Working on Central Line Infections:
 - 1,578 lives saved
 - 81,020 hospital days saved
 - Over \$165,000,000 in costs averted

Source: Peter Pronovost, Keystone ICU Project

Dr. Peter Pronovost Named To Time Magazine's 100 Most Influential People 2008



For his groundbreaking work in the area of patient safety, Johns Hopkins anesthesiologist Dr. Peter Pronovost has been named by the editors of Time Magazine as one of the 100 most influential people in the world for 2008. Time's annual list of the world's most influential people includes categories for leaders, revolutionaries, thinkers, heroes, pioneers, artists, entertainers, builders, titans and scientists. Dr. Peter Pronovost is currently leading several large national and international safety projects. His innovative work to improve

patient safety and care provided the needed momentum for the global medical community to begin to make important changes in how they approach their daily work.



Dr. Pronovost was recently profiled in The New Yorker article "The Checklist: If Something So Simple Can Transform Intensive Care, What Else Can It Do?". Peter Pronovost's checklist illustrates how the world's health care community can reduce infections in complex environments like the intensive care unit with steps as simple as a checklist.

5. เราสามารถลดการติดเชื้อจากโรงพยาบาลได้

1. จริง
2. ไม่จริง

5. โรงพยาบาล ม.อ.สามารถลดการติดเชื้อจากการใส่สายสวน central line ให้เป็น 0 ได้

1. ได้
2. ยังไม่ได้

2010 PSU Nosocomial Infections Report

AJIC major articles

National Healthcare Safety Network (NHSN) report: Data summary for 2006 through 2008, issued December 2009

Jonathan R. Edwards, MStat, Kelly D. Peterson, BBA, Yi Mu, PhD, Shalendra Banerjee, PhD, Katherine Allen-Bridson, RN, BSN, CIC, Gloria Morrell, RN, MS, MSN, CIC, Margaret A. Dudeck, MPH, Daniel A. Pollock, MD, and Teresa C. Horan, MPH
Atlanta, Georgia

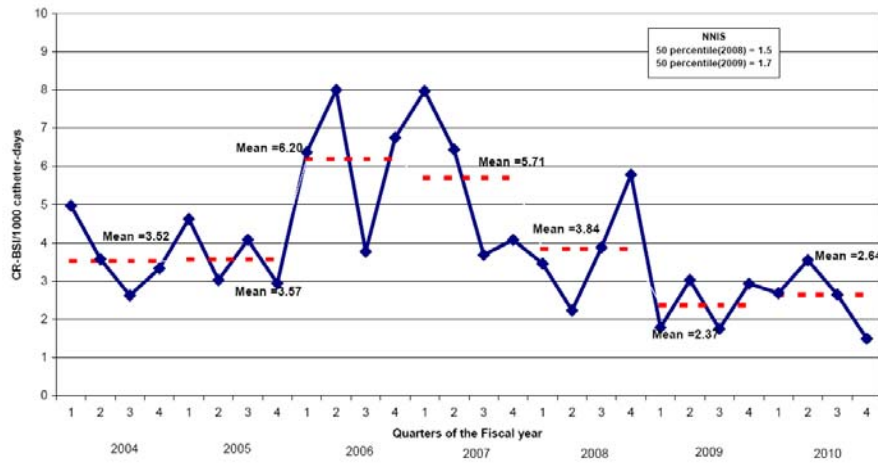
Am J Infect Control 2009;37:783-805

Table I. NHSN hospitals contributing data used in this report

Hospital type	N	(%)
Total	1545	100

Central line associated bloodstream infection (CL-BSI)

Overall central line associated bloodstream infection rate

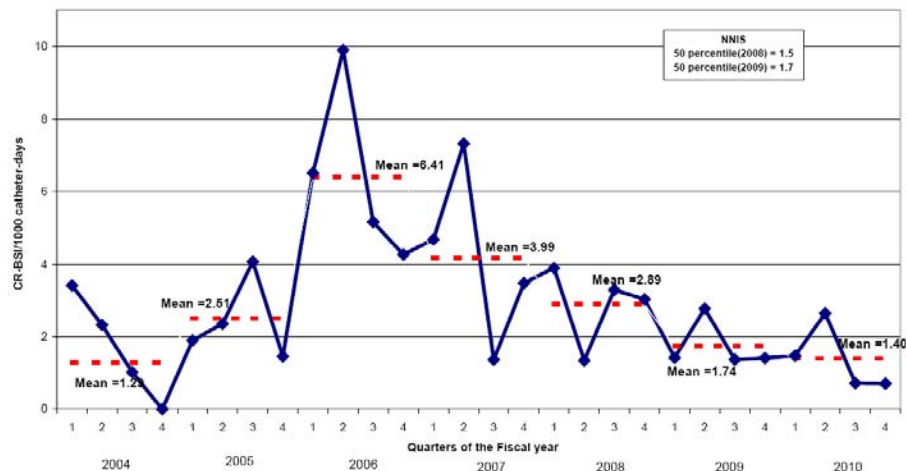


NHSN Central line-associated BSI rate[†]

Type of location	Percentile				
	10%	25%	50% (median)	75%	90%
Critical care units					
Medical/surgical major teaching	0.0	0.6	1.7	2.9	4.6
Neurosurgical	0.0	0.0	1.9	3.2	5.3
Trauma	0.0	1.4	3.0	5.5	9.3

อัตราการติดเชื้อ CL-BSI, PSU Hospital พศ	2552	2553	2554
ICUs	= 1.74	1.40	1.01
Neurosurgical	= 2.35	0.0	0.0
Trauma	= 0.0	4.75	0.0
Total	= 2.37	2.64	1.72

Central line associated bloodstream infection in ICU



5. โรงพยาบาล ม.อ.สามารถลด
การติดเชื้อจากการใส่สายสวน
central line ให้เป็น 0 ได้

1. ได้
2. ยังไม่ได้

การใช้ MSB ของผู้ทำหัตถการ	97.3
การใช้ MSB ของผู้ช่วยเหลือใน การทำหัตถการ	90.4

ข้อมูลผลการ monitor การใช้ Maximal Sterile Barrier ผู้ได้รับการทำหัตถการทั้งหมด 841 ราย ประจำปี 2553

Procedure	
- Subclavian	43.5
- Jugular	29.4
- Femoral	21.8
- Cut down	4.9
- PICC	0.3

Catheter-related infections Observation in 2,595 catheters

Site	Infection/1,000 cath-day	
	Local	BSI
Subclavian	1.6	1.0
Jugular	7.7	3.0
Femoral	15.8	8.3

Critical Care 2005;9:R631-5.

Selection of catheter insertion site

Use a subclavian site (rather than a jugular or a femoral site) in adult patients to minimize infection risk for nontunneled CVC placement *Category IA Suggestion.*

CDC .Guidelines for the Prevention of Intravascular Catheter-Related Infections MMWR 2002;51(RR10):1-28

ข้อมูลผลการใช้ Maximal Sterile Barrier 75 ราย ประจำ เดือน ธันวาคม 2552

รายการ	จำนวน	ร้อยละ
Femoral vein catheter	13	17.33
Int. Jugular vein catheter	18	24.00
Subclavian vein catheter	43	57.33
Cut down	1	1.33
รวม	75	100.00
ใช้ MSB	72	96.00

ที่ตำแหน่ง Femoral จำนวน 13 ราย

ลำดับ	หอผู้ป่วย	HN	indication
1	Med-ICU	725972	ทำHemodialysis
2	Med-ICU	1606131	ทำHemodialysis
3	Med-ICU	887253	ทำHemodialysis
4	Med-ICU	1474624	ทำHemodialysis
5	PICU	1312152	เพื่อประเมิน Volume/วัด CVP
6	PICU	1608813	เพื่อให้สารน้ำอย่างรวดเร็ว
7	PICU	1198904	เพื่อประเมิน Volume/วัด CVP

8	RCU	359099	ทำHemodialysis
9	Sur-ICU	603221	เพื่อให้สารน้ำอย่างรวดเร็ว
10	Sur-ICU	1597139	ทำHemodialysis
11	Sur-ICU	354039	เพื่อให้สารน้ำอย่างรวดเร็ว
12	Sur-ICU	1604414	ทำHemodialysis
13	ศัลยกรรมชาย 2	851844	ทำHemodialysis

Hemodialysis & BSIs

Use a fistula or graft instead of a CVC for permanent access for dialysis . Rates for bacteremia per 100 patient months were 0.2 for arteriovenous fistulas, 0.5 for grafts, 5.0 for cuffed catheters, and 8.5 for noncuffed catheters .

CDC .Guidelines for the Prevention of Intravascular Catheter-Related Infections MMWR 2002;51(RR10):1-28

Hoan B et al : A multicenter prospective study of risk factors for bacteremia in chronic hemodialysis patients. J Am Soc Nephrol 1998;9:869--76.

Chlorhexidine-Impregnated Sponges and Less Frequent Dressing Changes for Prevention of Catheter-Related Infections in Critically Ill Adults: A Randomized Controlled Trial

Jean-François Timsit; Carole Schwebel; Lila Bouadma; et al.

JAMA. 2009;301(12):1231-1241 (doi:10.1001/jama.2009.376)



BIOPATCH Protective Disk with chlorhexidine is placed around the insertion site of central venous and arterial catheters, absorbing blood or exudate and releasing chlorhexidine over a 7-day period

1653 Randomized

Gr 1 (416) = change of standard dressing q. 3 days

780 Catheters (369 patients) included

Gr 2 (412) = change of CHGIS dressing q. 3 days

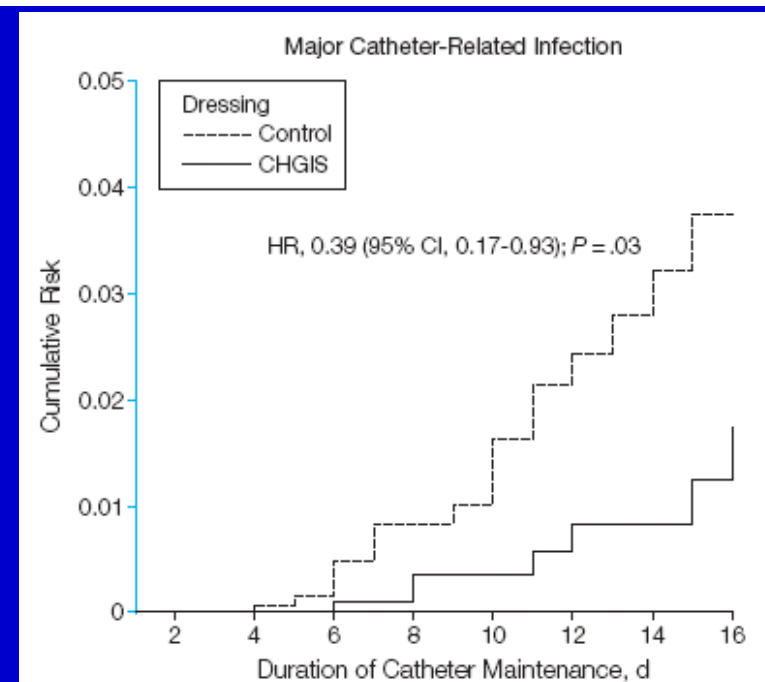
898 Catheters (379 patients) included

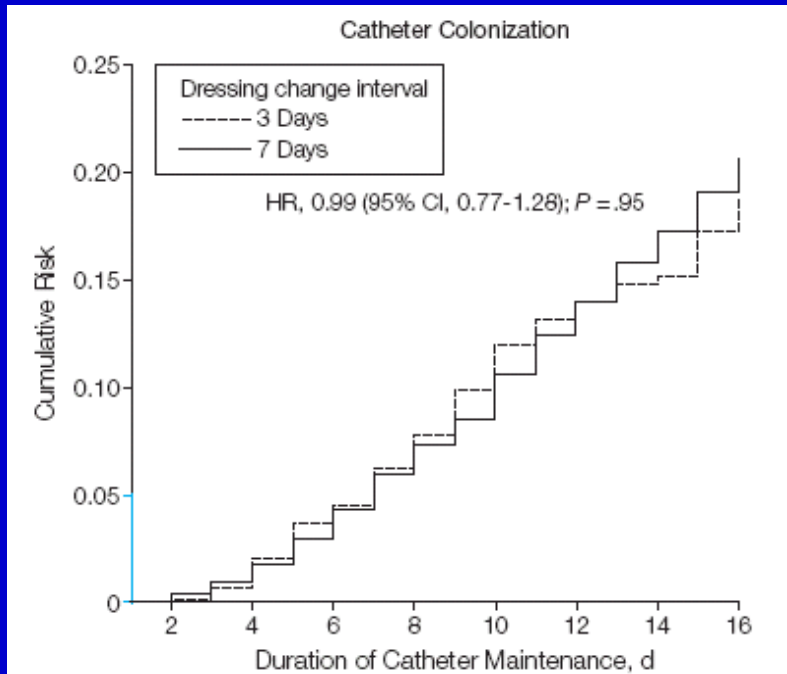
Gr 3 (412) = change of standard dressing q. 7 days

905 Catheters (387 patients) included

Gr 4 (413) = change of CHGIS dressing q. 7 days

949 Catheters (390 patients) included





Case 638027

หญิง ไทยใสศอายุ 24 ปี – **Problems:**

1 IgM nephropathy with Nephrotic syndrome Dx since 2538 partial response to steroid and immunosuppressive drug.

2 ESRD on hemodialysis ที่ รพ.มอ. ทู กวี นั้ งคาร และ ศู กร์

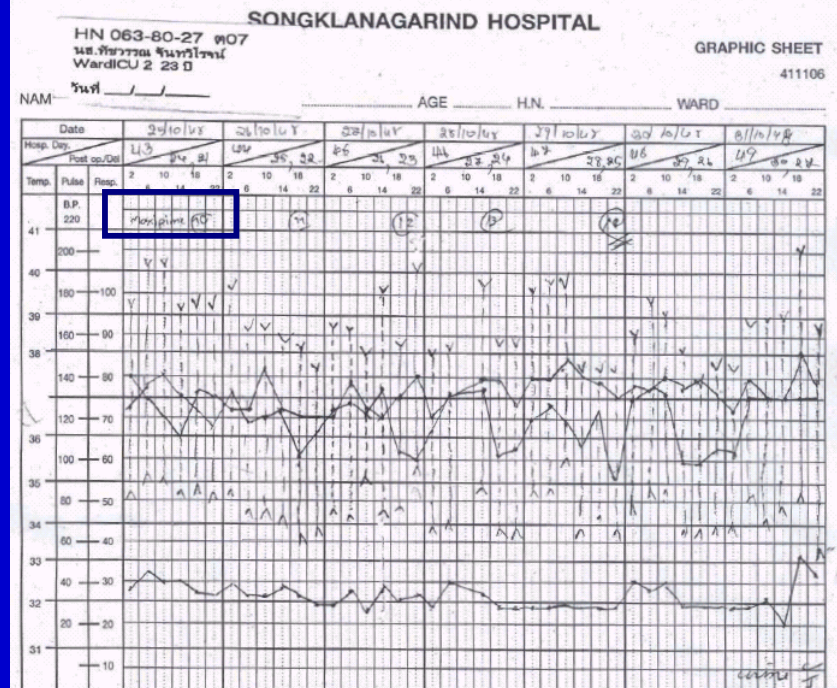
3 Admitted with Secondary peritonitis from ruptured appendicitis S/P peritoneal lavage and multiple retoileting.

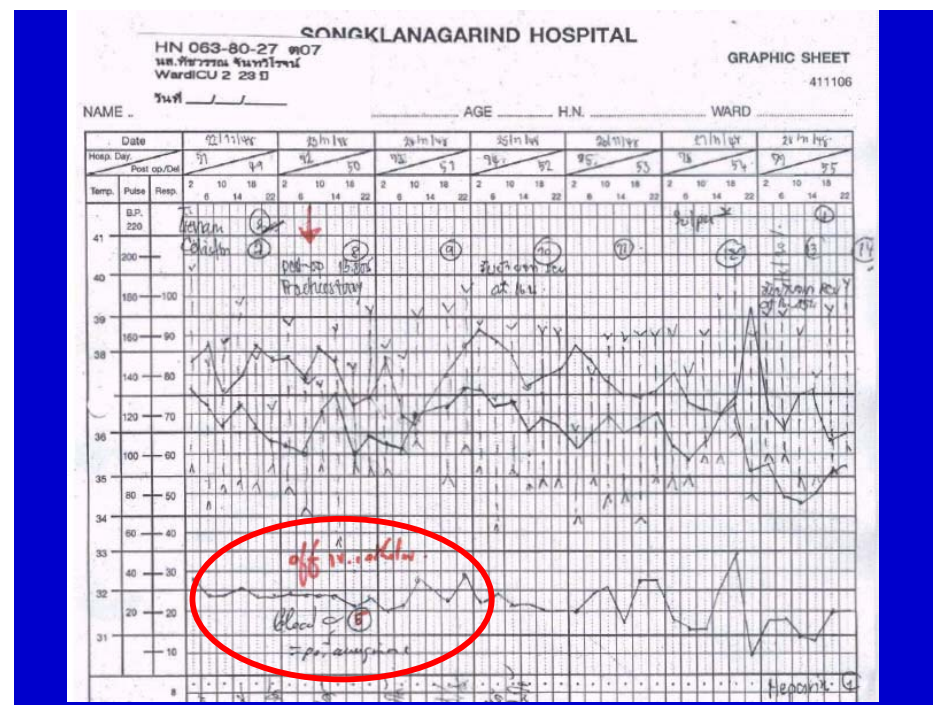
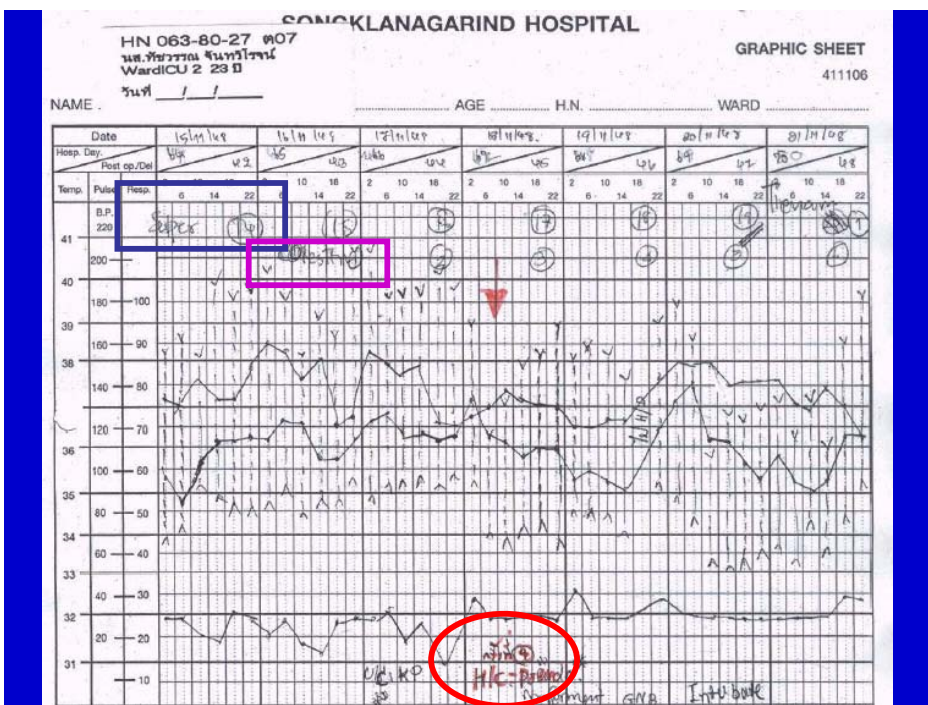
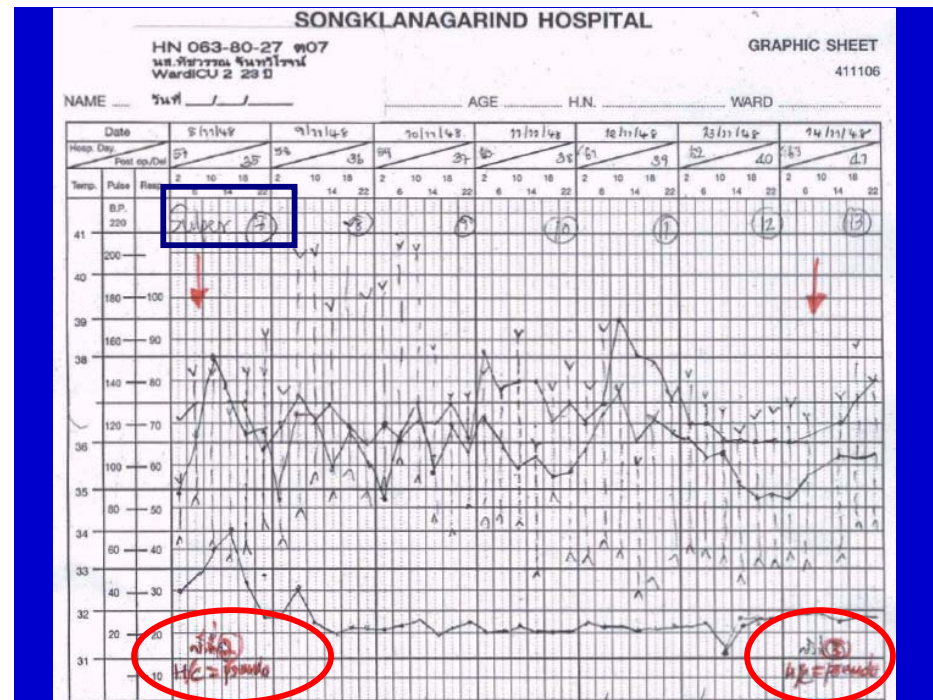
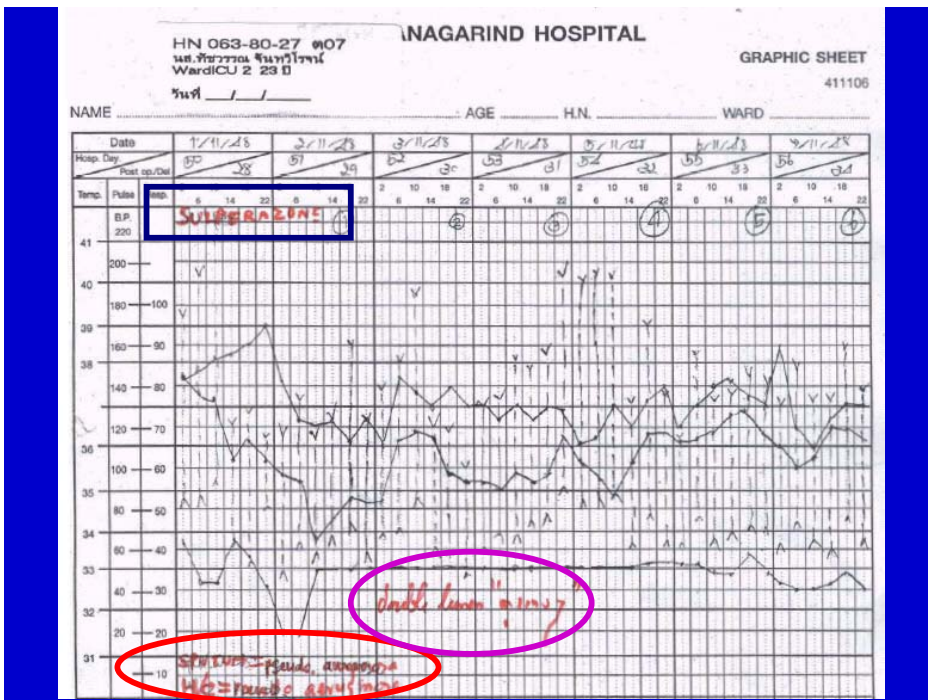
Clinically improved แล้ ว ช้ วงหลั้ ง complaint ปวดท้องที่ วุ้ ตตรวจไม่มี guarding ไม่มี ไข้ repeat CT abdomen : minimal ascites no abscess

1/11/2005: Developed fever and dyspnea

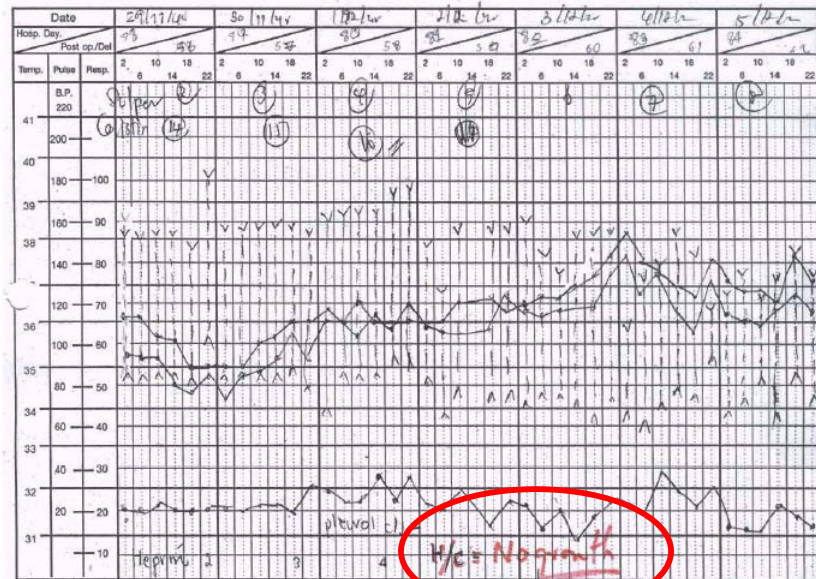
CXR: bilat. Pulmonary infiltrates

ABG: hypoxemia





NAME AGE H.N. WARD



การดูแล central venous catheter เพื่อป้องกันการติดเชื้อ

The key components of the Central Line Bundle

Institute for Healthcare Improvement

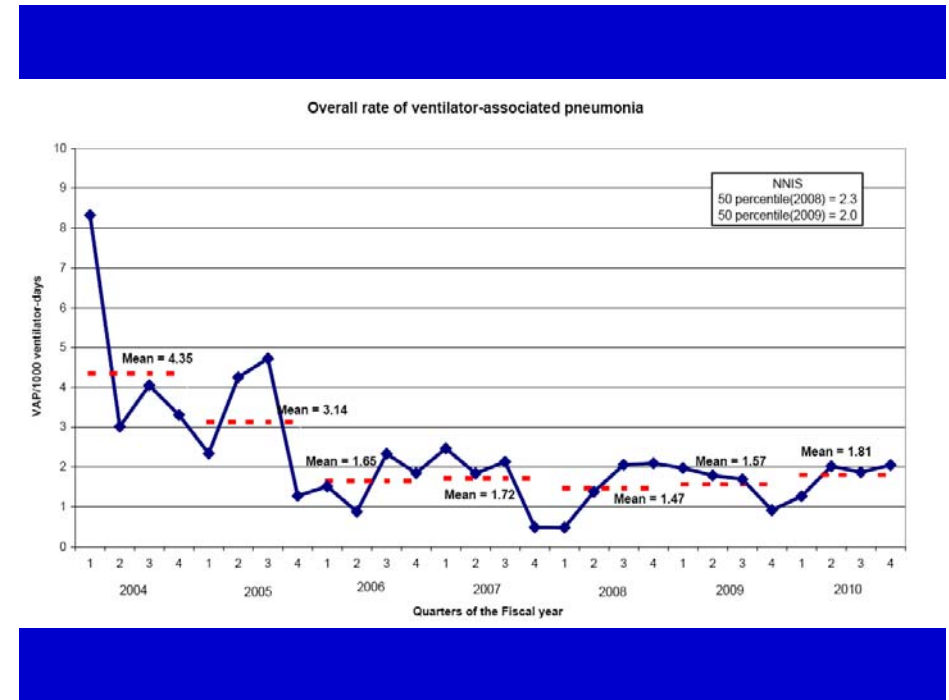
1. Hand Hygiene
2. Chlorhexidine Skin Antisepsis
3. Maximal Barrier Precautions
4. Optimal Catheter Site Selection
5. Daily Review

Prevention for Catheter Related Bloodstream Infections (CR-BSI)

หน่วยควบคุมการติดเชื้อ โรงพยาบาลขอนแก่น

สนับสนุนงบประมาณรณรงค์ฟื้นฟูคุณภาพระบบสุขภาพระดับจังหวัด ขอนแก่น

Ventilator-associated pneumonia (VAP)



NHSN Ventilator-associated PNEU rate*					
Type of location	Percentile				
	10%	25%	50% (median)	75%	90%
Critical care units					
Medical major teaching	0.0	1.0	2.2	4.2	8.3
Adult step-down unit (postcritical care)	0.0	0.0	1.3	4.7	6.0
Inpatient wards					
Medical	0.4				

อัตราการติดเชื้อ VAP, PSU Hospital พศ 2552	2553	2554
Med ICU = 1.18	2.31	2.14
Med RCU = 0.00	1.58	1.82

NHSN Ventilator-associated PNEU rate*					
Type of location	Percentile				
	10%	25%	50% (median)	75%	90%
Critical care units					
Surgical	0.0	1.8	3.8	6.5	9.9
Adult step-down unit (postcritical care)	0.0	0.0	1.3	4.7	6.0
Inpatient wards					
Neurosurgical	0.0	2.6	4.0	5.6	8.2
Surgical	0.7				

อัตราการติดเชื้อ VAP, PSU Hospital พศ 2552	2553	2554
ICU ศัลยกรรม = 2.06	1.63	2.48
S-RCU = NA	3.16	1.16

NHSN Ventilator-associated PNEU rate*					
Type of location	Percentile				
	10%	25%	50% (median)	75%	90%
Critical care units					
Surgical	0.0	1.8	3.8	6.5	9.9
Adult step-down unit (postcritical care)	0.0	0.0	1.3	4.7	6.0
Inpatient wards					
Neurosurgical	0.0	2.6	4.0	5.6	8.2
Surgical	0.7				

อัตราการติดเชื้อ VAP, PSU Hospital พศ 2552	2553	2554
ศัลยกรรมประสาท = 0.00	0.76	1.89
อุบัติเหตุ = 2.50	0.00	4.44

Clinical Infectious Diseases 2010;51(10):1123-1126

Ventilator-Associated Pneumonia: Is Zero Possible?

Michael Klompas
 Infection Control Department, Brigham and Women's Hospital, and Department of Population Medicine, Harvard Medical School and Harvard Pilgrim Health Care Institute, Boston, Massachusetts



IHI VAP bundle

Head of bed (HOB) elevation ≥ 30 degrees

DVT prophylaxis

Peptic ulcer prophylaxis

Daily interruption of sedatives

Daily evaluation of weaning criteria

DAILY GOALS SHEET

Room Number _____

Date ____/____/____

--Initial as goals are reviewed--

	0700-1500	1500-2300	2300-0700
What needs to be done for the patient to be discharged from the ICU?			
What is this patient's greatest safety risk? Neuro/ Pain Mgt / Sedation			
Cardiac / Volume status; Net goal for midnight			
Pulmonary/Ventilator (elevate HOB, glucose control, daily RSBI or SBT, weaning)			
Is this patient receiving DVT/PUD prophylaxis?			
Mobilization / OOB			

Compliance with VAP prevention bundle reduces VAP rate to 0

Thomas C. Button, RN, CNA, BC, CIC, Director of Infection Prevention & Control; Tammy Southard, RRT, Director Cardio/Pulmonary; Scott Donaldson, M.D., FCCP, Medical Director Critical Care ■ Medical Center of McKinney, McKinney, TX, USA



Objective of the intervention	Intervention methods	Results
The objective was to ensure compliance with all ventilator bundle processes, including routine q2 hour oral care, in order to reduce the rate of ventilator-acquired pneumonia (VAP) at the Medical Center of McKinney to 0.	<ul style="list-style-type: none"> The outcome measure for this performance-improvement initiative was the VAP rate per 1000 ventilator days. The medical records of VAP patients were routinely reviewed by Infection Prevention & Control and the Director of Respiratory Therapy to ensure compliance with the ventilator bundle. 	This quality-improvement program was initiated in 2004, and quantitative and qualitative metrics indicated that compliance with the protocol over the 4-y evaluation period improved patient outcomes. <ul style="list-style-type: none"> Implementation of a comprehensive q2 hour oral care protocol resulted in a VAP rate of 0 over 21 consecutive months; however, VAP rates spiked again. Identification of breaches in protocol compliance and inappropriate product use/infection control care gaps
Inspiration behind the intervention In 2003, the VAP rate spiked to 16.20 at the Medical Center of McKinney. The implementation of processes to ensure compliance	<ul style="list-style-type: none"> Each time that a spike in the VAP rate occurred, all products, records, and processes were 	

2011 Military Health System Conference

Ventilator Associated Pneumonia: Targeting Zero

The Quadruple Aim: Working Together, Achieving Success

Stephen M. Yamada MS, CIC

January 25, 2011



Tripler Army Medical Center
Honolulu, Hawaii

- Institute for Healthcare Improvement bundle
- Silver coated endotracheal tube
- Reinforced the ABC weaning protocol
- New closed suctioning system

2011 MHS Conference

So where are we now...



2011 MHS Conference

10

Summary

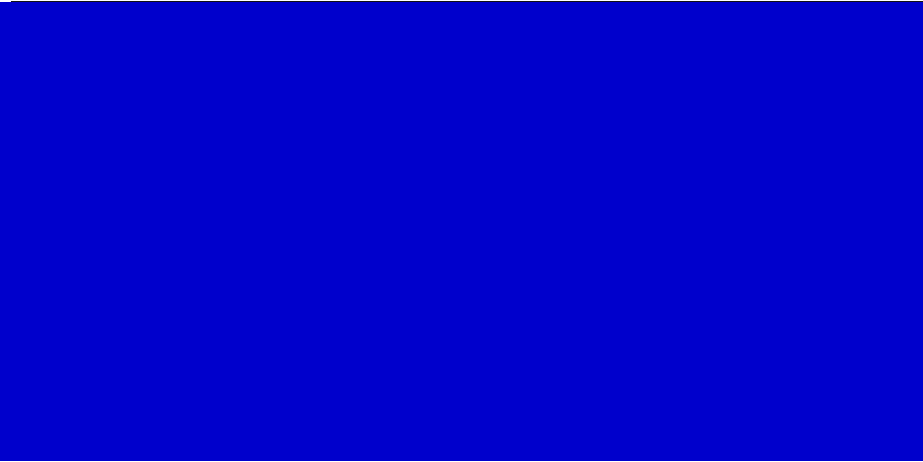
- Is a continuous process
- No longer just an “unfortunate” occurrence
- No longer satisfied to be below the national mean
 - Mean anchored us to mediocre performance
- Goal now is to strive for “zero”

2011 MHS Conference

Ventilator-Associated Pneumonia: Is Zero Possible?

Michael Klompas

Infection Control Department, Brigham and Women's Hospital, and Department of Population Medicine, Harvard Medical School and Harvard Pilgrim Health Care Institute, Boston, Massachusetts



Study	Design	Staff education campaign	Hand hygiene	Head of bed elevation	Thromboembolism prophylaxis	Stress ulcer prophylaxis
Zack et al [5]	Before-after	✓		✓		
Crunden et al [6]	Before-after			✓	✓	✓
Resar et al [7]	Before-after			✓	✓	✓
Berriel-Cass et al [8]	Before-after	✓	✓	✓	✓	✓
Burger and Resar [9]	Before-after			✓	✓	✓
Cocanour et al [10]	Before-after	✓	✓	✓		✓
Apisarnthanarak et al [11]	Before-after	✓	✓	✓		
Youngquist et al [11]	Before-after	✓	✓	✓	✓	✓
Youngquist et al [1]	Before-after	✓	✓	✓	✓	✓
Blamoun et al [3]	Before-after		✓	✓	✓	
Bloos et al [12]	Before-after			✓	✓	✓
Have et al [13]	Before-after	✓		✓		
Hutchins et al [14]	Before-after			✓	✓	✓
Marra et al [2]	Before-after	✓		✓	✓	✓
Zaydfudim et al [15]	Before-after			✓	✓	✓
Bird et al [16]	Before-after		✓	✓	✓	✓
Bouadma et al [17]	Before-after	✓	✓	✓		



Aspiration of subglottic secretions	Lung protective ventilation	Ventilator weaning protocol	Daily sedative interruption	Daily assessment of readiness to extubate	VAP rate before	VAP rate after	VAP reduction, %	P
			✓		12.6	5.7	58	<.001
			✓		NR	NR	NR	NR
			✓		6.6	2.7	59	<.001
			✓		8.2	3.3	60	.02
			✓	✓	6.0	0.7	88	NR
			✓	✓	22.3	10.7	52	<.05
		✓			20.6	8.5	59	.001
✓			✓	✓	6.1	0	100	NR
✓			✓	✓	2.7	1.7	37	NR
✓		✓	✓	✓	14.1	0	100	.006
	✓				37.6	45.9	-22	NR
✓			✓	✓	19.2	7.5	61	NR
			✓	✓	12.6	1.3	90	NR
✓			✓	✓	16.4	10.4	37	.05
			✓	✓	15.2	9.3	39	.01
✓			✓	✓	10.2	3.4	67	.004
		✓			22.6	13.1	43	<.001



Prevention of VAP: Position of the patient

In the absence of medical contraindication(s), elevate at an angle of 30--45 degrees of the head of the bed of a patient at high risk for aspiration (e.g., a person receiving mechanically assisted ventilation and/or who has an enteral tube in place).

CDC Guidelines for Preventing Health-Care--Associated Pneumonia, 2003 MMWR 2004;53 (RR03) 1-36

Prevention of VAP: Prevention of aspiration.

Gastric overdistention should be avoided (eg. reducing the use of narcotics, monitoring gastric residual volumes after intragastric feedings and using agents that increase gastrointestinal motility).

VAP: ? Secretions that pool above inflated endotracheal-tube cuffs ?

Prevention of VAP: Continuous Subglottic Suctioning?

Incidence rate of VAP was 19.9 episodes/1000 ventilator days in the patients receiving continuous aspiration of subglottic secretions and 39.6 episodes/1000 ventilator days in the control patients (relative risk, 1.98; 95% CI, 1.03 to 3.82). VAP occurred later in patients receiving continuous aspiration (12.0 +/- 7.1 days) than in the control patients (5.9 +/- 2.1 days) (P = 0.003). No significant differences in outcome were found.

Ref.:Valles Jet al. Ann Intern Med 1995;122:179-186

Subglottic secretion drainage : Beneficial?

Lower VAP rates may be associated with subglottic secretion drainage rather than standard endotracheal tubes (2 trials, 1 showing a significant difference; range of RRs, 0.46-0.57).

Ref.: Cook D et al. JAMA 1999; 281:2089

Subglottic secretion drainage: Beneficial?

If feasible, use an endotracheal tube with a dorsal lumen above the endotracheal cuff to allow drainage (by continuous or frequent intermittent suctioning) of tracheal secretions that accumulate in the patient's subglottic area. *Category 2 suggestion. CDC Guidelines for Preventing Health-Care--Associated Pneumonia, 2003 MMWR 2004;53 (RR03) 1-36*

Journal of Antimicrobial Chemotherapy (2008) 62, 5–34
doi:10.1093/jac/dkn162
Advance Access publication 29 April 2008

JAC

Guidelines for the management of hospital-acquired pneumonia in the UK: Report of the Working Party on Hospital-Acquired Pneumonia of the British Society for Antimicrobial Chemotherapy

R. G. Masterton^{1*}, A. Galloway², G. French³, M. Street⁴, J. Armstrong⁵, E. Brown⁶, J. Cleverley⁷, P. Dilworth⁸, C. Fry⁹, A. D. Gascoigne¹⁰, Alan Knox¹¹, Dilip Nathwani¹², Robert Spencer¹³ and Mark Wilcox¹⁴

We recommend that to prevent VAP, measures should be taken to reduce the risk of aspiration and this should include subglottic drainage and positioning. Recommendation Grade B

Prevention of VAP: Cuff Pressure
83 consecutive intubated patients undergoing continuous aspiration of subglottic secretions (CASS). Multivariate analysis showed the protective effect of antibiotic use (relative risk [RR] = 0.10; 95% confidence interval [CI] = 0.01 to 0.71), whereas failure of the CASS technique (RR = 5.29; 95% CI = 1.24 to 22.64) was associated with a greater risk of pneumonia. In addition, there was a trend toward a higher risk of pneumonia (RR = 2.57; 95% CI = 0.78 to 8.03) among patients with persistent intracuff pressures below 20 cm H₂O.

Ref.: Rello J et al. *Am. J. Respir. Crit. Care Med* 1996;154:111

Mouthcare vs VAP

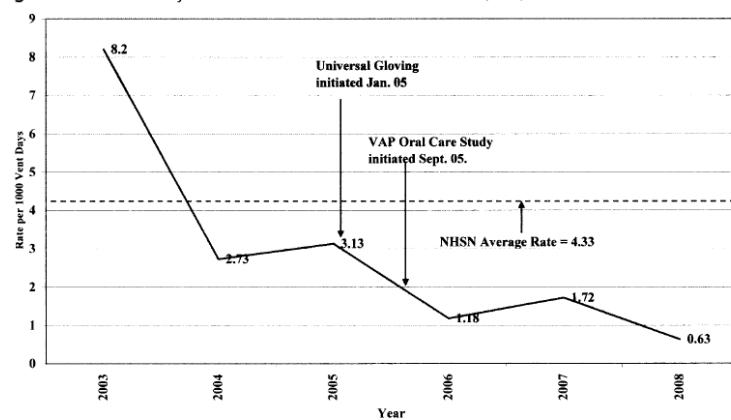


Oral Care Intervention to Reduce Incidence of Ventilator-Associated Pneumonia in the Neurologic Intensive Care Unit

Lorraine B. Fields

interventions from the Institute of Healthcare Improvement's VAP bundle, including (a) elevating the head of the bed of ventilated patients to 30°, (b) preventing venous thromboembolism through use of sequential compression devices or anticoagulation, (c) administering gastric acid histamine blockers, (d) practicing good hand hygiene, (e) initiating early mobilization, and (f) performing daily sedation interruption at 10 am to evaluate neurologic status. The one intervention not included in the IHI bun-

Fig 2. Summa Health System Ventilator-Associated Pneumonia (VAP) Rates 2003–2008



Note: NHSN = National Healthcare Safety Network

VAP: Mouthwash?

In a study of patients undergoing cardiac surgery, a **69% reduction in the incidence of total respiratory tract infections (17/180 vs 5/173; $p < 0.05$) and reduction in mortality in the chlorhexidine-treated group** were noted (1.16% vs 5.56%).

However, overuse could result in colonization and superinfection with chlorhexidine-resistant pathogens.

Ref.: DeRiso AJ II et al. *Chest* 1996;109:1556-1561

VAP: Mouthwash?

No recommendation can be made for the routine use of an oral chlorhexidine rinse for the prevention of health-care-associated pneumonia in all postoperative or critically ill patients and/or other patients at high risk for pneumonia (Unresolved issue)

Use an oral chlorhexidine gluconate (0.12%) rinse during the perioperative period on adult patients who undergo cardiac surgery.

CDC Guidelines for Preventing Health-Care--Associated Pneumonia, 2003 MMWR 2004;53 (RR03) 1-36

Randomized Controlled Trial and Meta-analysis of Oral Decontamination with 2% Chlorhexidine Solution for the Prevention of Ventilator-Associated Pneumonia

Hutsaya Tantipong, MD; Chantana Morkchareonpong, MD; Songyod Jaiyindee, MD; Visanu Thamlikitkul, MD

TABLE 2. Outcomes for 207 Study Patients Who Received Mechanical Ventilation and Oral Decontamination

Variable	Chlorhexidine group (n = 102)	Normal saline group (n = 105)	P
No. (%) of patients who developed VAP	5 (4.9)	12 (11.4)	.08 ^a
No. of cases of VAP per 1,000 ventilator-days, mean	7	21	.04
No. (%) of patients with irritation of oral mucosa	10 (9.8)	1 (0.9)	.001

NOTE. VAP, ventilator-associated pneumonia.

^a Relative risk, 0.43 (95% confidence interval, 0.16-1.17).

จากกระทรวงสาธารณสุข

คณะกรรมการอาหารและยา

ห้ามใช้คลอเฮกซิดีนเป็นสารระงับเชื้อ กับเครื่องสำอองในช่องปาก

เกรงเกิดผลเสียต่อฟันและประสาทรับรส สำนักงานคณะกรรมการอาหารและยา
ออกประกาศเครื่องสำออง สั่งห้ามใช้คลอเฮกซิดีนเป็นสารระงับเชื้อกับเครื่องสำอองใน
ช่องปาก ใช้เป็นวัตถุกันเสียในปริมาณไม่เกิน 0.3%

Journal of Hospital Infection (1985) **6**, 369–378

**Gastrointestinal colonization and septicaemia with
Pseudomonas aeruginosa due to contaminated
thymol mouthwash in immunocompromised
patients**

**J. R. Stephenson, S. R. Heard,
M. A. Richards and S. Tabaqchali**

*Departments of Medical Microbiology and Medical Oncology,
St Bartholomew's Hospital, London EC1A 7BE*

(Medication) in- line Nebulizers





ICU (Medication) in- line Nebulizer : Cultures

Specimen no. culture	Results of culture
1	8 x 10 ³ K. pneumoniae
	10 ⁴ Acinetobacter
2 aeruginosa	> 10 ⁴ Pseudomonas
	> 10 ⁴ Acinetobacter
3 aeruginosa	> 10 ⁴ Pseudomonas
	> 10 ⁴ E. coli

Contaminated Medication Nebulizers

18 (68%) of 19 Nebulizer reservoirs

- Bacterial aerosols were produced by 10 (71%) of 14 Nebulizers
- 60 % = Gram negative bacteria
- “in - line medication nebulizers should be cleaned or disinfected after each treatment rather than every 24 hours”

(Craven DE et al : AJM 1984 ; 77 : 834)





Disinfection of Medication nebulizer:How often?

“Between treatments on the same patient, clean, disinfect, rinse with sterile water, or air-dry small-volume medication nebulizers.”

CDC Guidelines for Preventing Health-Care--Associated Pneumonia, 2003 MMWR 2004;53(RR03): 1-36

Contaminated multiple - use medication nebulizer

in - use albuterol solutions had pH values that were unstable and level of preservatives declined over time to level capable of supporting bacterial growth of

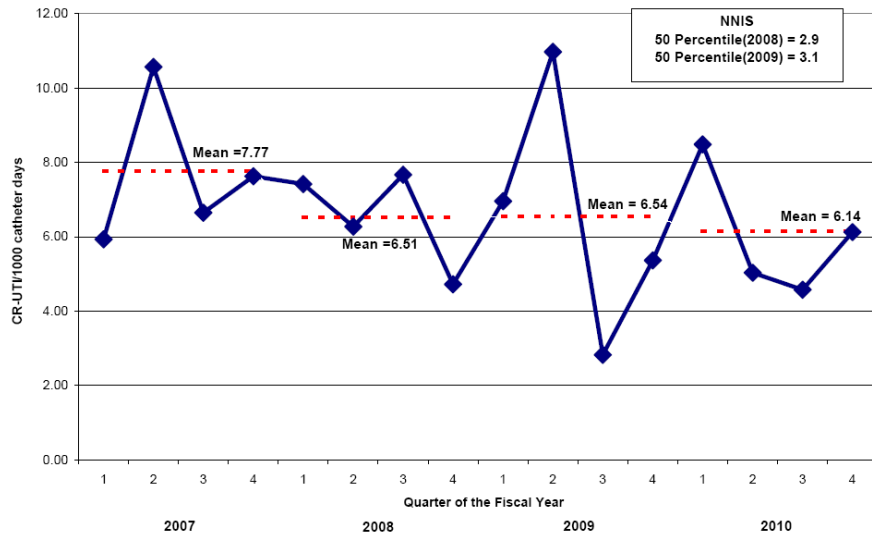
B. cepacia No further isolates of *B. cepacia* were identified after institution of appropriate infection control procedures.

Hamill RJ et al : Ann Intern Med 1995 ; 122 : 762



2010 CR-UTI, Department of Medicine

Catheter-Associated Urinary Tract Infection in ICU



CATHETER-ASSOCIATED URINARY TRACT INFECTIONS IN INTENSIVE CARE UNITS CAN BE REDUCED BY PROMPTING PHYSICIANS TO REMOVE UNNECESSARY CATHETERS

Wei-Chun Huang, MD; Shue-Ren Wann, MD; Shoa-Lin Lin, MD; Calvin M. Kunin, MD; Ming-Ho Kung, MD; Chin-Hsun Lin, MD; Chien-Wei Hsu, MD; Chun-Peng Liu, MD; Susan Shin-Jung Lee, MD; Yung-Ching Liu, MD; Kwok-Hung Lai, MD; Tzu-Wen Lin

Infect Control Hosp Epidemiol 2004;25:974-978.

Daily reminders to physicians

Infect Control Hosp Epidemiol 2004;25:974

- ICU of a tertiary-care hospital, Taiwan
- Daily reminders to physicians
- From ICU nurse
- To remove unnecessary urinary catheter
- After 5 days of insertion

Average Duration of Catheterization (d)

Observational Group	Intervention Group	P
7.0 (± 1.1)	4.6 (± 0.7)	< .001

Rate of CAUTI ()*

Observational Group	Intervention Group	P
11.5 (± 3.1)	8.3 (± 2.5)	.009

Effectiveness of Multifaceted Hospitalwide Quality Improvement Programs Featuring an Intervention to Remove Unnecessary Urinary Catheters at a Tertiary Care Center in Thailand

Anucha Apisarnthanarak, MD; Kanokporn Thongphubeth, RN; Sirinaj Sirinvaravong, MD; Danai Kitkangvan, MD; Chananart Yuekyen, RN; Boonyasit Warachan, PhD; David K. Warren, MD; Victoria J. Fraser, MD

Infect Control Hosp Epidemiol 2007; 28:791-798

July 2004- June 2005 = Baseline observation phase
July 2005- June 2006 = intervention phase

Interventions

Daily bedside discussions among treating physicians and the intervention team. (a representative of the hospital administration, an ID. physician, a clinical microbiologist, 2 internists, 2 ICNs, chief nurses from all patient units, and a hospital epidemiologist.) to remind physicians to remove unnecessary urinary catheters in patients who had had indwelling urinary catheters for 3 days or longer

Appropriate indications

Urinary retention

Obstruction to the urinary tract distal to the bladder

Close monitoring of urine output in critically ill patients

Fluid challenge in patients with acute renal insufficiency

Preoperative insertion for patients going directly to the operation room

Comfort care in terminally ill patient

Urinary incontinence that poses a risk to the patient (eg, because of major skin breakdown or a nearby surgical site)

Inappropriate indications

No longer needed for monitoring of urine output

Unclear indication in patients for whom catheter serves no useful purposes

Urinary incontinence without significant skin breakdown

Neurogenic bladder for which intermittent self-catheterization is possible

Convenience of care

For administration of amphotericin B bladder irrigation

Staff are too busy to remove catheter

Staff forgot to remove catheter

Characteristic	Preintervention (<i>n</i> = 1,105)	Postintervention (<i>n</i> = 1,307)	<i>P</i> ^a
Age, mean ± SD, years	48 ± 8.7	52 ± 7.9	.24
Female sex	519 (47)	640 (49)	.35
Principal condition diagnosed ^b			
APACHE II score, mean ± SD	14 ± 7.7	15 ± 8.6	.85
Type of urinary catheter			
Foley catheter	906 (82)	1,098 (84)	.24
Condom catheter	111 (10)	105 (8)	.20
Suprapubic catheter	44 (4)	39 (3)	.21
Percutaneous nephrostomy tube	22 (2)	39 (3)	.15
Clean intermittent catheterization	22 (2)	26 (2)	.88

a total of 906 (82%) of the patients had an order for urinary catheter placement in the medical record, and during the postintervention phase, 1,097 (84%) of the patients had such an order ($P = .42$)

Rates of Inappropriate Urinary Catheterization

Preintervention ($n = 1,105$)	Postintervention ($n = 1,307$)	P^a
225 (20.4)	144 (11)	.04

Duration of catheterization, mean \pm SD, days

Units	Preintervention	Postintervention	P
Medical	9.6 \pm 3.3	3.2 \pm 1.0	<.001
Surgical	7.3 \pm 2.3	1.5 \pm 0.5	<.001
ICU	14 \pm 3.8	5.6 \pm 1.0	<.001
All ^a	11 \pm 2.5	3 \pm 0.7	<.001

CA-UTI rate, mean \pm SD, episodes per 1,000 catheter-days

Preintervention	Postintervention	P
21.5 \pm 10.0	6.5 \pm 4.3	.02
19.4 \pm 5.4	7.8 \pm 6.1	.03
23.4 \pm 13.7	3.5 \pm 6.4	.01
21.5 \pm 5.5	5.2 \pm 2.1	<.001

Total length of hospitalization, mean&SDdays

Preintervention (n = 1,105)	Postintervention (n = 1,307)	P ^a
16 ± 5.4	5 ± 3.2	<.001

Monthly hospital cost of antibiotic therapy for CA-UTI, mean +/- SD, US\$

Preintervention (n = 1,105)	Postintervention (n = 1,307)	P ^a
3,739 ± 1,422	1,378 ± 651	<.001

Cost of hospitalization per patient, mean& SD, US\$

Preintervention (n = 1,105)	Postintervention (n = 1,307)	P ^a
366 ± 62	154 ± 34	<.001

Non-invasive measurement of bladder volume as an indication for bladder catheterization after orthopaedic surgery and its effect on urinary tract infections.

Slappendel R, Weber EW. Eur J Anaesthesiol. 1999 Aug;16(8):503-6.

Pre intervention period:

Catheterization was performed if there was no spontaneous diuresis by 8 h after surgery.

Intervention period:

A non-invasive ultrasound was used.

Catheterization was performed only if the bladder volume was more than 800 mL 8 h after surgery.

	No.	% caththerized	No. of UTI
Before:	1920	31%	18
After:	2196	16%	5

รายงานการเกิด CA-UTI ปี 2553

- มีผู้ป่วยที่ใส่สายสวนปัสสาวะ 2811 ราย
- จำนวนวันรวมที่คาสายสวนปัสสาวะ 11761 วัน
- จำนวนวันเฉลี่ยของการคาสายสวนปัสสาวะ 4.18 วัน
- เกิด CA-UTI 60 ราย (2.1%)

รายงาน Case ที่เกิด CA-UTI ปี 2553 (n = 60 ราย)

วันที่เกิด CA-UTI

- 1-5 วัน 29 ราย (18.33%)
- >5 วัน 31 ราย (51.67%)

มีการใส่สายสวนปัสสาวะ จำนวน 85 ครั้ง

- ใส่จาก ward 55 ครั้ง (64.71%)
- ใส่จาก OR 13 ครั้ง (20.00%)
- ใส่จาก ER 17 ครั้ง (15.29%)