

The 38th KSCCM Annual Congress and
Acute Critical Care Conference 2019

Nursing Care Intensity and Nurse Staffing in ICUs

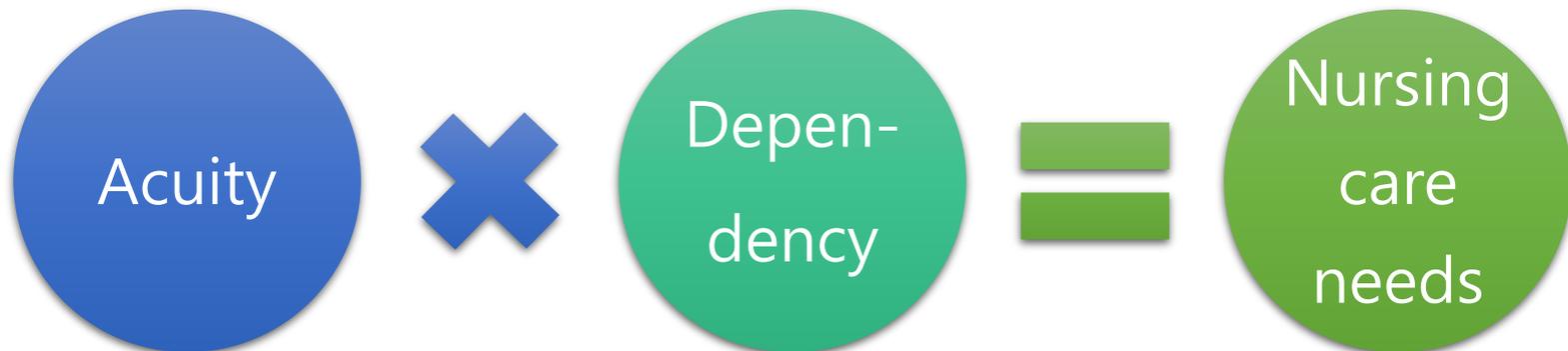
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Safe Nurse Staffing

- **Appropriate nurse staffing (ANA, 2012)**
 - A match of registered nurse expertise with the needs of the recipient of nursing care services in the context of the practice setting and situation
- **Nursing care intensity**
 - Nursing care needs, workload, intensity
 - Measurement tools: ICUs, general wards, and EDs



Patient Classification System (PCS)

- **General wards (KPCS-1)**

- 한국형 환자분류도구-1(KPCS-1)의 신뢰도와 타당도 검증 및 간호시간 환산지수 산출 (2010)

- **Adult ICUs (KPCSC)**

- 한국 중환자간호 분류도구 개발 (2015)

- **Neonatal ICUs (KPCSN)**

- 한국형 신생아중환자간호 분류도구 개발 (2016)

- **KPCS-GW, KPCS-ICU, KPCS-NICU**

- 한국형 환자분류체계의 개정연구 (2018)

- **간호·간병통합서비스 (일반병동, 재활병동)**

- 중증도·간호필요도(보건복지부·국민건강보험공단)

간호·간병통합서비스 간호필요도 평가

간호활동		
활력징후 측정 및 감시	활력징후측정 7회 이상/1일	1점
	순환/감각/운동 4회 이상/1일	
	동공/의식/지남력 4회 이상/1일	
섭취량/배설량 측정 4회 이상/1일		1점
계속적인 감시	심전도 모니터링	1점
	동일 검사 2회 이상/1일	
산소포화도 측정 6회 이상/1일		1점
흡인 간호(기관 내)		1점
정맥 내 투약: 정맥내 투여약품(수액 제외) 합이 6회 이상/1일		1점
기타 투약: 6회 이상/1일 (근육 내 혹은 피하주사의 횟수)		1점
배액관 보유 2개 이상		1점
신체보호대 적용 및 관리		1점
전문치료 시행	마약제(주사제, 경구, 부착제)	1점
	항암치료제(주사제, 경구제)	
	승압제(주사제)	
	항부정맥제(주사제)	
	면역억제제(주사제, 경구제)	
	면역억제제(경구제)	
	항혈전/색전제(정맥주사제)	
	수혈	

일상생활능력	
체위변경	0점: 도움없음 1점: 일부도움 2점: 전부도움
이동	
식사섭취	
배변	

간호·간병통합서비스 간호인력 배치기준

(보건복지부·국민건강보험, 2019)

	Patient-to-Nurse Ratio	Patient-to-Nursing Assistant Ratio
상급 종합병원	5 : 1 이하 6 : 1 이하 7 : 1 이하	30 : 1 이하 40 : 1 이하
종합병원	7 : 1 이하 8 : 1 이하 10 : 1 이하 (표준) 12 : 1 이하	25 : 1 이하 30 : 1 이하
병원	10 : 1 이하 12 : 1 이하 (표준) 14 : 1 이하 16 : 1 이하	40 : 1 이하

PCS, Nursing Hours, & Nurse Staffing

	환자군	NHPPD	환자수	평균 NHPPD	간호사 1인당 환자수
병원A	1군	2.0	21	2.4	1 : 10
	2군	2.5	16		
	3군	3.0	6		
	4군	4.0	2		
	합계		45		
병원B	1군	2.0	4	3.0	1 : 8
	2군	2.5	12		
	3군	3.0	16		
	4군	4.0	10		
	합계		42		

NHPPD=nursing hours per patient day

Nurse Staffing Grades: Beds per RN

- 중환자실 입원료 가감
 - 간호인력확보수준에 따른 중환자실 입원환자 간호관리료 차등제
 - 기준: 일반/신생아/소아 간호사 1인당 병상수

	General/adult ICUs		Neonatal ICUs		Pediatric ICUs
	상급종합병원	종합병원 병원	상급종합병원 종합병원	병원	상급종합병원 종합병원/병원
Grade 1	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50
Grade 2	0.50 ≤ < 0.63	0.50 ≤ < 0.63	0.50 ≤ < 0.75	0.75 ≤ < 1.00	0.50 ≤ < 0.61
Grade 3	0.63 ≤ < 0.77	0.63 ≤ < 0.77	0.75 ≤ < 1.00	1.00 ≤ < 1.50	0.61 ≤ < 0.74
Grade 4	0.77 ≤ < 0.88	0.77 ≤ < 0.88	1.00 ≤ < 1.50	1.50 ≤ < 2.00	0.74 ≤ < 0.86
Grade 5	≥ 0.88	0.88 ≤ < 1.00	1.50 ≤ < 2.00	≥ 2.00	≥ 0.86
Grade 6		1.00 ≤ < 1.25	≥ 2.00		
Grade 7		1.25 ≤ < 1.50			
Grade 8		1.50 ≤ < 2.00			
Grade 9		≥ 2.00			

ICU Patient Care Fee (중환자실 입원료 가감산)

- 기본 등급 대비 가산: 등급 상승에 따른 수가 가산폭 동일
- 직전 등급 대비 가산: 상위 등급으로 갈수록 가산 확대

	Adult and Pediatric ICUs		Neonatal ICUs		Pediatric ICUs
	상급종합병원	종합병원 병원	상급종합병원 종합병원	병원	상급종합병원 종합병원/병원
Grade 1	1.44	2.30	1.60	1.45	1.45
Grade 2	1.15	1.84	1.45	1.30	1.30
Grade 3	1.00	1.53	1.30	1.15	1.15
Grade 4	0.75	1.33	1.15	1.00	1.00
Grade 5	0.64	1.21	1.00	0.75	0.75
Grade 6		1.10	0.75		
Grade 7		1.00			
Grade 8		0.75			
Grade 9		0.64			

중환자실 간호관리료 차등제 분석

- 환자 중증도 ⇒ 간호시간 ⇒ 배치기준 ⇒ 간호관리료
 - 간호사 배치수준에 따른 간호관리료 가감산
 - 배치수준에 따른 간호시간 상대가치와 실제 간호관리료 가감률
- 배치기준에 따른 간호관리료
 - 단순히 중증도에 따른 입원료(간호관리료)로 개편할 경우 수가는 올라갔으나 배치수준은 수가만큼 향상되지 않을 수 있음
- 간호사 배치기준 지표
 - 근무조별 간호사 1인당 환자수로 변경
 - 환자수 파악 어렵다? 이미 간호·간병통합서비스에서 사용
 - 지방 일반병동 간호관리료차등제: 병상수에서 환자수로 전환(2018)
- 병상유형간 간호관리료 정합성
 - 간호·간병통합서비스: 상급종합병원 1:5 간호간병료
 - 일반 중환자실: 상급종합병원 2등급(1:2.6) 간호관리료

ICU Nurse Staffing in Other Countries

- **Japan**

- Intensity of Nursing Care Needs (중증도, 의료·간호필요도)
- Nurse staffing based on nursing intensity: ICU, HCU, general wards

- **California**

- ICUs: 2 patients per licensed nurse since 1977 by law
- Minimum nurse staffing law (1999) by type of patient care unit (e.g., 1:5 in medical-surgical units)

- **Massachusetts: ICU Patient Assignment Law (2016)**

- Certification of **acuity tools**
- Reporting of **staff nurse-to-patient ratios** to the state government and posting the ratios on the hospital website
- Staff nurses (RNs providing direct patient care) only in the ratio calculation, excluding nurse managers
- The maximum patient assignment for each staff nurse **may not exceed two** ICU Patients.
- Nothing prohibits the assignment of more than one staff nurse to an ICU Patient.

일본 『중증도, 의료·간호필요도』

(Tsutsui & Tanaka, 2018)

		특정집중치료실 (중환자실)	High Care Unit (준중환자실)
A 항 목 모 니 터 링 및 처 치 등	창상 처치		1점
	소생술 시행		1점
	호흡케어		1점
	점적라인 동시 3개 이상 관리		1점
	심전도 모니터 관리	1점	1점
	수액펌프 관리	1점	1점
	동맥압측정(동맥라인)	2점	1점
	시린지펌프 관리	1점	1점
	중심정맥압 측정(중심정맥라인)	2점	1점
	인공호흡기 관리	2점	1점
	수혈 및 혈액제제 관리	2점	1점
	폐동맥압 측정(Swan-Ganz catheter)	2점	1점
	특수한 치료법 CHDF, IABP, PCPS, 보조인공심장, ICP 측정, ECMO)	2점	1점

일본 『중증도, 의료·간호필요도』

		특정집중치료실 (중환자실)	High Care Unit (준중환자실)
B 항 목 환 자 상 황 비	체위변경	1점: 의지할 것 있으면 가능	2점: 불가능
	이승(移乘)	1점: 일부 도움	2점: 전부 도움
	구강청결	1점: 도움 있음	
	식사섭취	1점: 일부 도움	2점: 전부 도움
	의복탈착	1점: 일부 도움	2점: 전부 도움
	진료 영양 상 지시 이행	1점: 아시오	
	위험행동	2점: 있음	

ICU & HCU Nurse Staffing in Japan

		배치 기준	간호필요도
특정 집중 치료실	특정집중치료실관리료 1-2	2:1	A항목 4점 이상 & B항목 3점 이상인 환자 80% 이상
	특정집중치료실관리료 3-4	2:1	A항목 4점 이상 & B항목 3점 이상인 환자 70% 이상
HCU	HCU 입원의료관리료 1	4:1	A항목 3점 이상 & 항목 4점 이상인 환자 80% 이상
	HCU 입원의료관리료 2	5:1	A항목 3점 이상 & 항목 4점 이상인 환자 60% 이상

Massachusetts General Hospital - Medical ICU Blake 7

Acute Care

Medical ICU Blake 7

Adult Critical Care - Medical

1035 Hospital Licensed Beds

How to Read and Understand Staffing Plans

Date of Services Budgeted: FY 2018

A well-staffed unit is not only defined by the number of caregivers included in the team, but by the carefully chosen members of each team depending upon the needs of each patient and the unit overall.

Average Number of Patients Per Day:	15.50
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Direct Caregivers	Scheduled Hours	Shift Length	Number of Staff						
			Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Day Shift									
RN	7am-3pm	8.00	15.30	15.30	15.30	15.30	15.30	15.00	15.00
Unlicensed Assistive Personnel	7am-3pm	8.00	2.80	2.80	2.80	2.80	2.80	2.80	2.80
Evening Shift									
RN	3pm-11pm	8.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Unlicensed Assistive Personnel	3pm-11pm	8.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Night Shift									
RN	11pm-7am	8.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Unlicensed Assistive Personnel	11pm-7am	8.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

자료: PatientCareLink (Massachusetts Health & Hospital Association)



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MGH has been publicly reporting staffing level information via the [PatientCareLink](#) website since 2006. As such, the budgeted annual staffing plans for MGH ICUs, as well as the planned staffing versus actual staffing provided for each unit can be found at www.patientcarelink.org. In addition, in accordance with the State of Massachusetts regulations 958 CMR 8.00 "Patient Assignment Limits for Registered Nurses in Intensive Care Units (ICUs) in Acute Hospitals", the data demonstrates the actual staffing ratios for MGH ICUs.

2016 Nurse Staffing Reports

[January - March](#)

[April - June](#)

[July - September](#)

[October - December](#)

2017 Nurse Staffing Reports

[January - March 2017](#)

[April - June 2017](#)

[July - September 2017](#)

[October - December 2017](#)

2018 Nurse Staffing Reports

[January - March 2018](#)

[April - June 2018](#)

[July - September 2018](#)

Nurse Staffing and Patient Outcomes

Structure

간호사 배치수준

- 간호사 1인당 환자수
- 1일 환자 간호시간
- 구성(skill-mix):
간호사 비중(RN %)
- 교육 수준
- 근무 경력

Process

간호서비스

- 다양한 간호행위
- 환자 관찰/모니터링
- 조기 발견과 대처
- 감염관리: 무균술, 손위생
- 기본간호(목욕 등)
- Missed care

Outcomes

환자건강/안전

- 사망(mortality)
- Healthcare-acquired infections
- Hospital-acquired conditions
- 환자경험

Nurse Staffing and Patient Mortality in Intensive Care Units

Sung-Hyun Cho ▼ Jeong Hae Hwang ▼ Jaiyong Kim

- ▶ **Background:** Research evidence suggests that nurse staffing influences patient outcomes.
- ▶ **Objectives:** To examine the relationship between nurse staffing and patient mortality in Korean intensive care units (ICUs).
- ▶ **Methods:** Using survey and administrative databases, this study included 27,372 ICU patients discharged from 42 tertiary and 194 secondary hospitals. Ownership (public vs. private), location (metropolitan city vs. province), size, specialization of ICUs (specialized vs. mixed), physician staffing and nurse staffing, and years of nurse experience were included as hospital and ICU characteristics. Nurse

ated with improved patient outcomes (Lankshear, Sheldon, & Maynard, 2005). Among those patient outcomes, mortality is an important and frequently used indicator for hospital quality, although some researchers express skepticism about its sensitivity to nursing care quality (Tourangeau, 2005; van Servellen & Schultz, 1999). Recent studies reported that higher levels of nurse staffing are associated with lower rates of in-hospital mortality, 30-day mortality, or failure to rescue (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Tourangeau, Cranley, & Jeffs, 2006). Favorable nurse staffing is characterized by high levels of nurse-to-patient ratio, skill mix (registered nurse [RN] hours),

Nurse staffing, quality of nursing care and nurse job outcomes in intensive care units

Sung-Hyun Cho, Kyung Ja June, Yun Mi Kim, Yong Ae Cho, Cheong Suk Yoo, Sung-Cheol Yun and Young Hee Sung

Aim. To examine the relationship between nurse staffing and nurse-rated quality of nursing care and job outcomes.

Background. Nurse staffing has been reported to influence patient and nurse outcomes.

Design. A cross-sectional study with a survey conducted August–October 2007.

Methods. The survey included 1365 nurses from 65 intensive care units in 22 hospitals in Korea. Staffing was measured using two indicators: the number of patients per nurse measured at the unit level and perception of staffing adequacy at the nurse level. Quality of care and job dissatisfaction were measured with a four-point scale and burnout measured by the Maslach Burnout Inventory. Multilevel logistic regression models were used to determine the relationships between staffing and quality of care and job outcomes.

Results. The average patient-to-nurse ratio was 2.8 patients per nurse. A fifth of nurses perceived that there were enough nurses to provide quality care, one third were dissatisfied, half were highly burnt out and a quarter planned to leave in the next year. Nurses were more likely to rate quality of care as high when they cared for two or fewer patients (odds ratio, 3.26; 95% confidence interval, 1.14–9.31) or 2.0–2.5 patients (odds ratio, 2.44; 95% confidence interval, 1.32–4.52), compared with having more than three patients. Perceived adequate staffing was related to a threefold increase (odds ratio, 2.97; 95% confidence interval, 2.22–3.97) in the odds of nurses' rating high quality and decreases in the odds of dissatisfaction (odds ratio, 0.30; 95% confidence interval, 0.23–0.40), burnout (odds ratio, 0.50; 95% confidence interval, 0.34–0.73) and plan to leave (odds ratio, 0.40; 95% confidence interval, 0.28–0.56).

2017년도(2차) 중환자실 적정성 평가결과

2018. 8.

• 평가대상

- 상급종합병원 43개
- 종합병원 239개
- 일반 중환자실
- 소아 중환자실과 신생아 중환자실 제외

• 대상기간

- 2017년 5-7월(3개월)

• 평가 지표

- 구조 4개, 과정 2개, 결과 1개
- 모니터링 지표

• 평가결과

- 종합점수(모니터링 지표 제외)
- 1-5등급

• 평가결과 공개

- 심평원 홈페이지 병원평가정보

• 자료분석

- 발표자 계산

- 평가지표: 총 14개(평가지표 7개, 모니터링 지표 7개)
 - 구조(6), 과정(3), 결과(5)

구분	부문	지표
평가지표 (7)	구조	1. 전담전문의 1인당 중환자실 병상 수
		2. 간호사 1인당 중환자실 병상 수
		3. 중환자실 전문장비 및 시설 구비 여부
		4. 중환자실 진료 프로토콜 구비율
	과정	5. 심부정맥 혈전증 예방요법 실시 환자 비율
		6. 표준화사망을 평가 유무
	결과	7. 48시간 이내 중환자실 재입실률
모니터링 지표* (7)	구조	8. 다직종 회진 일수 비율
		9. 인공호흡기 사용 환자 비율
	과정	10. 감염 관련 Bundle 수행 여부
	결과	11. 중환자실 사망률
		12. 중심도관 혈행 감염률
		13. 인공호흡기 사용 환자 폐렴 발생률
		14. 요로카테터 관련 요로감염 발생률

* 모니터링 지표 : 기관별 지표값 산출 후 개별기관에 통보하되 공개하지 않는 지표

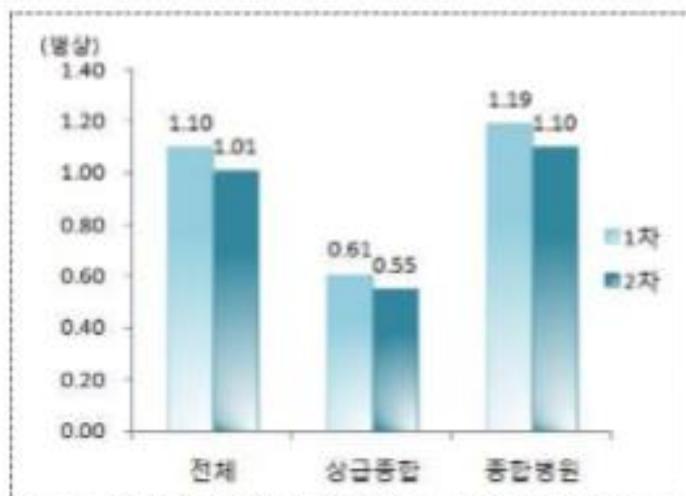
“간호사 1인당 중환자실 병상수 평균은 1.01병상으로 전 차수(2014년) 1.10병상에 비해 차이가 크지 않음”

[표12] 간호사 1인당 중환자실 병상 수

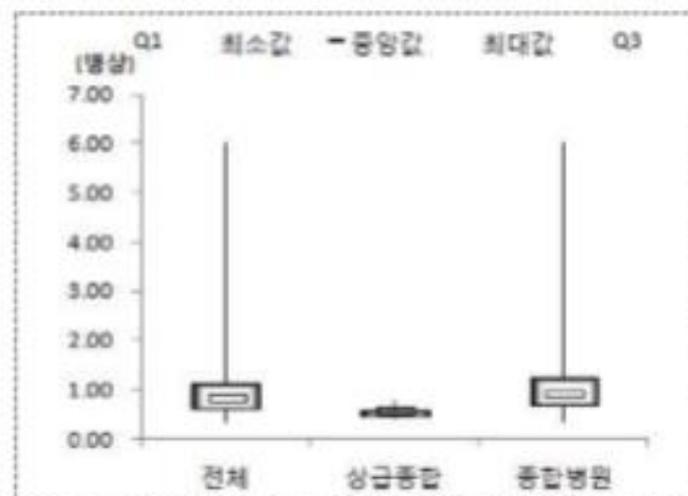
(단위: 병상, %)

구분	기관수	기관별 분포						
		평균	표준편차	중앙값	최대값	최소값	Q1	Q3
전체	280	1.01	0.69	0.83	6.00	0.35	0.60	1.15
상급종합	43	0.55	0.07	0.57	0.78	0.41	0.46	0.59
종합병원	237	1.10	0.72	0.92	6.00	0.35	0.69	1.26

※ 차등제 미신고 2기관 제외



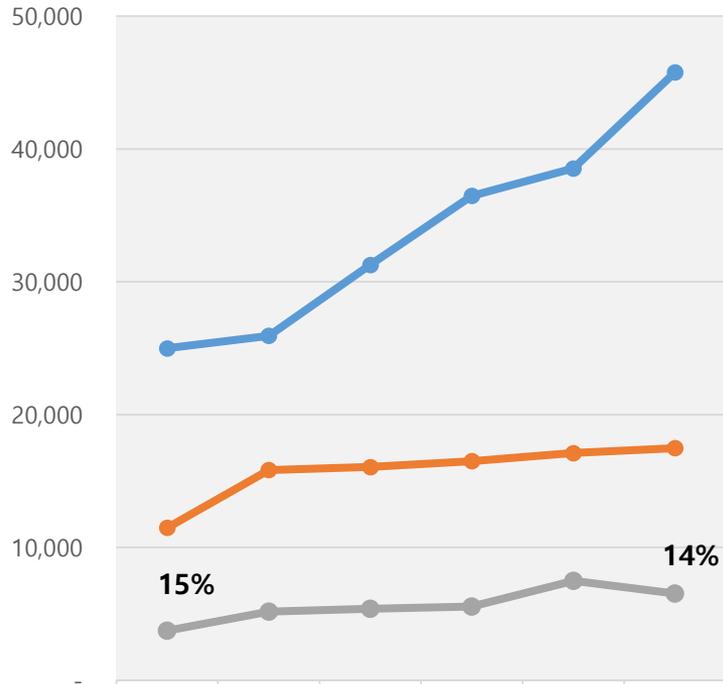
<그림 7-1> 요양기관 종별 평균



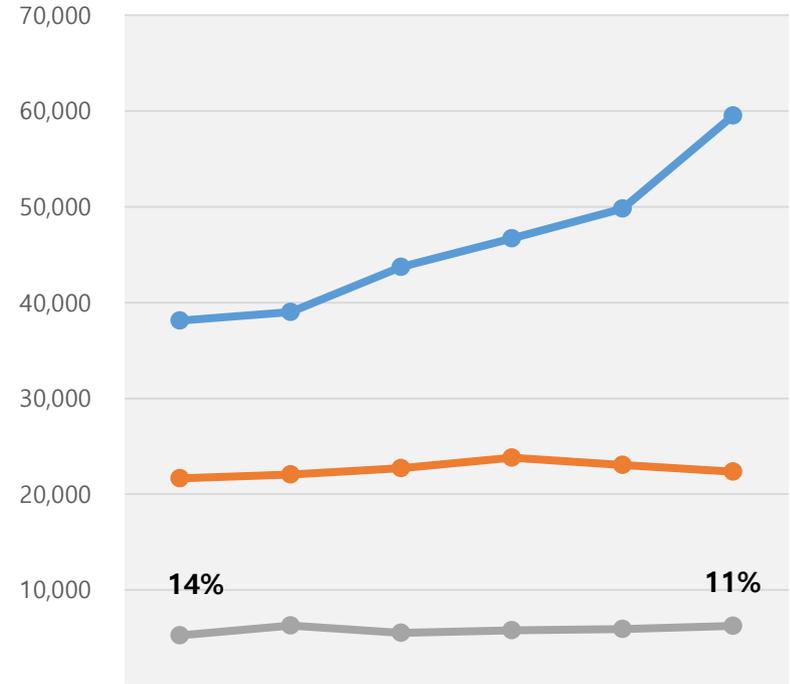
<그림 7-2> 종별 분포 현황

부서별 간호사수 추이: 2011-2016

국민보건의료실태조사(보건복지부, 2017); 발표자 계산



상급종합병원



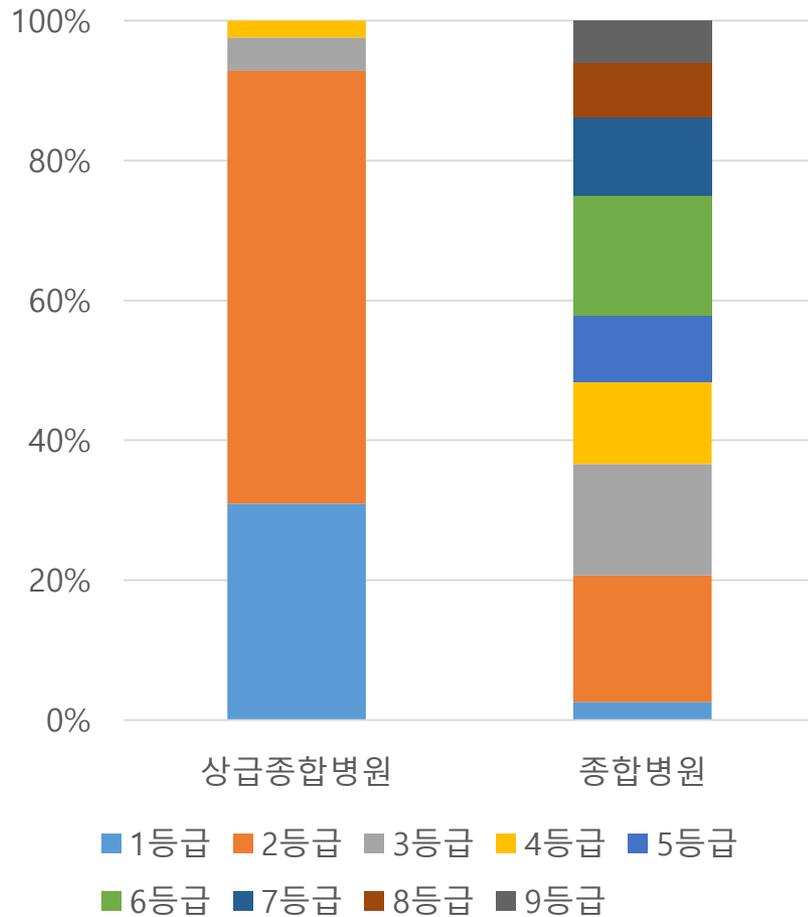
종합병원

	2011	2012	2013	2014	2015	2016
전체 부서 간호사	24,993	25,943	31,282	36,473	38,540	45,763
일반병동 간호사	11,484	15,829	16,062	16,504	17,116	17,482
중환자실 간호사	3,732	5,176	5,399	5,543	7,486	6,524

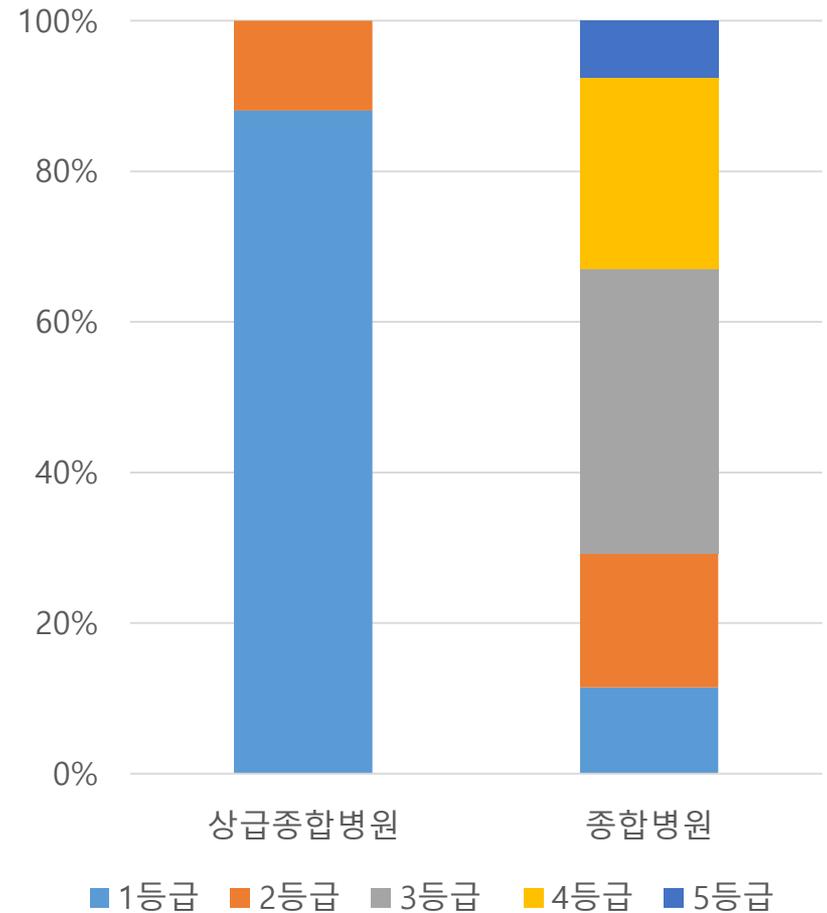
	2011	2012	2013	2014	2015	2016
전체 부서 간호사	38,112	39,025	43,700	46,700	49,803	59,504
일반병동 간호사	21,652	22,047	22,710	23,808	23,041	22,365
중환자실 간호사	5,264	6,278	5,530	5,806	5,909	6,264

Nurse Staffing & Performance Grades

Nurse Staffing Grades



Performance Grades



Nurse Staffing & Performance Grades:

종합병원 간호등급과 평가등급 (발표자 분석)

	평가등급				
간호등급	1등급	2등급	3등급	4등급	5등급
1등급	83.3	16.7			
2등급	45.2	23.8	26.2	4.8	
3등급	8.1	32.4	51.4	8.1	
4등급		25.9	55.6	18.5	
5등급		18.2	50.0	31.8	
6등급		5.0	35.0	55.0	5.0
7등급		15.4	42.3	30.8	11.5
8등급		11.1	27.8	38.9	22.2
9등급			14.3	28.6	57.1

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Saving Lives and Dollars](#)

Home > Performance Reports > Keeping Patients Safe > Central-Line Associated Bloodstream Infections in the ICU

Text Size: [A](#) | [A](#) | [A](#)

Central-Line Associated Bloodstream Infections in the ICU

What are we measuring and why?

For patients in the ICU, a central line is often necessary to receive fluids and medication. Sometimes, patients can develop bloodstream infections associated with these catheters. This is called a "central line associated bloodstream infection", and it can lead to serious complications. To reduce the risk of infection, it is important to remove the line as soon as it is no longer medically necessary, as well as maintain the cleanliness of the line and insertion site while it is in place. MGH monitors the rate of central line infections developed in intensive care units by the number of line days (number of patients in a day with at least one central line).

How are we doing and how do we compare to best practice?

MGH provides care in several different types of ICUs and tracks central line associated infections in each unit. The rate across all ICUs is reported on a semiannual basis in the table below. We compare our performance to national benchmarks published by the National Healthcare Safety Network (NHSN).

	Rate	Comparator	Number of Infections	Line Days
Jan-Jun 11	1.23	1.7	15	12212
Jul-Dec 11	1.52	1.7	20	13135
Jan-Jun 12	1.22	1.4	17	13946
Jul-Dec 12	1.37	1.4	20	14552
Jan-Jun 13	1.53	1.4	23	15046

Nurse Staffing for Improving ICU Patient Care

- **Nurse staffing**

- Acuity tools: number of indicators, applicable nationwide
- Number of patients per RN each shift

- **Increasing patient acuity**

- “Quicker & sicker”: shorter length of stay and higher patient turnover
- Higher staffing grade (e.g., less than 2 patients per RN)

- **ICU patient care fees**

- Should be based on **nursing hours** per patient required

- **3차 상대가치 개편**

- 기본진료료(진찰료, 입원료), 정책과정참여

- **Reducing nurse turnover to retain competent nurses**

- High nurse turnover due to heavy workload
- Training and patient assignment for newly graduated nurses