

Surviving and Thriving Without 24-Hour Call: The Art and Science of Schedule Re-Engineering

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UMDNJ – New Jersey Medical School, Newark, NJ
ACGME Annual Educational Conference
Session 49: March 6, 2010

Current ACGME Duty Hours Standards

- Maximum 80 hours/wk, averaged over 4 wks
- 24 + 6 maximum consecutive duty hours
- Average in-hospital call not more frequent than every 3rd night
- Minimum 10-hour rest between duty periods
- 1 day in 7 duty-free, averaged over 4 weeks

Why Change?

Clear and compelling evidence that current ACGME duty hours standards have not fully achieved intended goals of improving safety and well-being of patients and residents



Sleep Deprivation and Resident Performance

- 17-21 hours of wakefulness produced decrements in cognitive performance similar to blood alcohol concentration of 0.05 % or more; 24 hours wakefulness comparable to BAC 0.10%
- In national survey of PGY-1 residents, rate of percutaneous exposures twice as high at night and 60% greater during post-call days (after 24+ hour call) than on non-post-call days
- Medical interns made ~36% more serious medical errors and ~57% more non-intercepted serious errors while working traditional 24+ hours on-call than when limited to 16 or less consecutive hours

Sleep Deprivation and Resident Performance

- Adequate sleep essential for learning and memory consolidation
- In 2006 national survey of 500 pediatric residents, 73% still reported falling asleep during a conference *after* implementation of 2003 ACGME duty hour limits
- In same survey 8% of residents reported making a patient care error because of fatigue
- Consecutive duty hours of 16 hours or less associated with marked decreases in attention failures and serious medical errors

Sleep Deprivation and Driving Performance

- Sleep debt and irregularity of sleep habits adversely affect driving performance
- Risks of driving while sleepy comparable to risks while driving drunk
- Odds of MVA commuting home from work more than double after an extended shift than after non-extended (<24 hour) shift in 2005 multispecialty survey of interns
- Near-misses 5 times as likely in same survey
- Rates of resident MV crashes unchanged after program accommodations for 2003 ACGME duty hour limits implemented (2008 report)

Continuity of Resident Learning

- Post-call inpatient/critical care residents often not present “mentally” even if present physically for attending rounds and noon conference
- Residents on elective not present 1-2 days per week due to post-call home early in traditional every 4th overnight call system

Maggie's Law

- 2003 – New Jersey first state to enact Maggie's Law
- Upgraded vehicular homicide to a crime of the first degree when caused by a driver who was without sleep for a period in excess of 24 hours

European Working Time Directive

- Initially implemented in 1993 for all public and private sectors except...”transport, sea fishing, other work at sea and the activities of doctors in training”
- Extended to doctors-in-training in 2004: maximum 13 hour shifts, 58 hours/week
- Effective 2009, further reduction to maximum 48 hours per week for residents in the European Community

Current Work-Hour Regulations: Other U.S. Occupations

- Airplane pilots

<16 daily hours, >8-12 hours rest required since 1985, <34 hours flight time/week

- Interstate truck and bus drivers

<14 consecutive hours, > 10 consecutive rest hours, < 60 hours/week

- Nuclear power plant operators

<16 consecutive hours, <72 hours/week

2008 IOM Recommendations

- Maximum 80 hours/week, averaged over 4 weeks
- 16 consecutive duty hours with no protected sleep break OR admit patients 16 hours, 5 hour protected sleep between 10 PM and 8 AM, remainder for transition and educational activities
- Maximum every 3rd night in-hospital call, no averaging



More 2008 IOM Recommendations

- Minimum 10 hours off after day shift, 12 hours after night shift, 14 hours after extended duty period (30 hours)
- 4 night maximum in-hospital night shifts; 48 hours off after 3 or 4 consecutive nights
- 5 days off per month
- 24 hours off per week, no averaging
- One 48-hour period off per month


If we don't do it...

- Under new occupational health law in Australia and New Zealand, administrators can be held responsible for errors caused by their junior housestaff and motor vehicle accidents during drive home from work



Schedule Re-Engineering: The Art

- Who are the stakeholders?
- What are the barriers?
- How to achieve buy-in?



Schedule Re-Engineering: The Science (and the Math)

- Re-working the annual master schedule
- Re-designing the on-call schedules

Re-Designing the Annual Master: Assess Current Staffing

Service	# Seniors Daytime	# Seniors On-Call Overnight	# Juniors Daytime	# Juniors On-Call Overnight
Inpatient	A	D	G	J
ICU - 1	B	E	H	K
ICU - 2	C	F	I	L

Re-Designing the Annual Master: Eliminating 24-Hour Call

	# Months Night Team/Senior	# Months Night Team/Junior
Inpatient	$\frac{12 \times D}{\# \text{Seniors}}$	$\frac{12 \times J}{\# \text{Juniors}}$
ICU – 1	$\frac{12 \times E}{\# \text{Seniors}}$	$\frac{12 \times K}{\# \text{Juniors}}$
ICU - 2	$\frac{12 \times F}{\# \text{Seniors}}$	$\frac{12 \times L}{\# \text{Juniors}}$

Re-Designing the Annual Master: Scheduling Considerations

- Daytime staffing # = (current N -1) for services with traditional every 4th night extended shifts (24+6)
- Day Team to precede Night Team assignment on same service
- Golden weekend or vacation to follow Night Team when possible
- Who to cover Night Team gaps? (elective, Day Team, internal night team)
- Coverage needs (resident level, #) may change with season, resident experience
- What's expendable? Electives? ED months?



Our Results

Re-Engineered Schedule: Pediatrics

- 24-hour call completely eliminated since July 04
- Day Team/Night Team scheduling on all services
- Longest assigned shift 14 hours
- Minimum 10-hour break between inpatient shifts
- Mandatory 4-hour break if assigned Friday night covering call (or ED night after Continuity Clinic)
- 90 minutes for AM and PM turnovers/hand-offs
- Daily teaching hour for Night Team residents
- Golden weekend (~60 hour break) each month
- No-call PL-1: 2 wks, PL-2: 4 wks, PL-3: 8 wks

Annual Master Schedule, Then and Now

02-03	J	A	S	O	N	D	J	F	M	A	M	J
R-1	W	W	W	W	W	TN	N	ED	ED	CD	E	V
R-2	W	W	NF	N	N	P	ED	ED	AM	E	E	V
R-3	W	W	W	N	P	ED	CM	E	E	E	E	V

09-10	J	A	S	O	N	D	J	F	M	A	M	J
R-1	W	W	W	W	NT	TN	N	ED	ED	CD	E	V
R-2	W	NT	N	N	P	PN/ ED	ED	AM	E	E	E	V
R-3	W	W	W	NT	N	P	ED	CM	E	E	E	V

Night Team

- Assigned in two-week blocks
- 4 weeks PL-1, 6 weeks PL-2, 4 weeks PL-3
- Approximately 75 hours/week
- 7:30 PM-9:30 AM Sunday-Thursday or Friday
- Golden weekend following Night Team block
- 2-3 weekend nights/month on Day Team/elective

UNIVERSITY HOSPITAL
INPATIENT and CRITICAL CARE SERVICES

DEPARTMENT OF PEDIATRICS
MARCH 2010

F-BLUE

7A-9P M-F

7:30P-9:30A M-F

8A-9P Sat, Sun, Hol

7:30P-9A Sat, Sun, Hol

PICU

7A-9P M-F

7P-9A

8A-9P Sat, Sun, Hol

Scheduled Inpatient Work Hours

	DAY TEAM	NIGHT TEAM
Team Leaders		
Weekdays	7AM-9PM except Continuity Day 7AM-5PM	7:30PM-9:30AM
Weekends/Holiday	8AM-9PM	7:30PM-9:00AM
Junior Residents		
Weekdays	7AM-5PM with 'long call 5PM- 9PM mean Q3	7:30PM-9:30AM
Weekends/Holiday	8AM-9PM	7:30PM-9:00AM

Scheduled Work Hours

ROTATION	HOURS/ WEEK
Day Team – Inpatient/PICU	68-72
Night Team - Inpatient/PICU	74-78
Nurseries (internal night team)	72-75
ED	55-60
Senior Required Subspecialty	50 (40 if no-call)
Junior Required Subspecialty	60 (40 if no-call)

Mean hours/week PL-1:66, PL-2:63, PL-3:60

CONTINUITY OF CARE

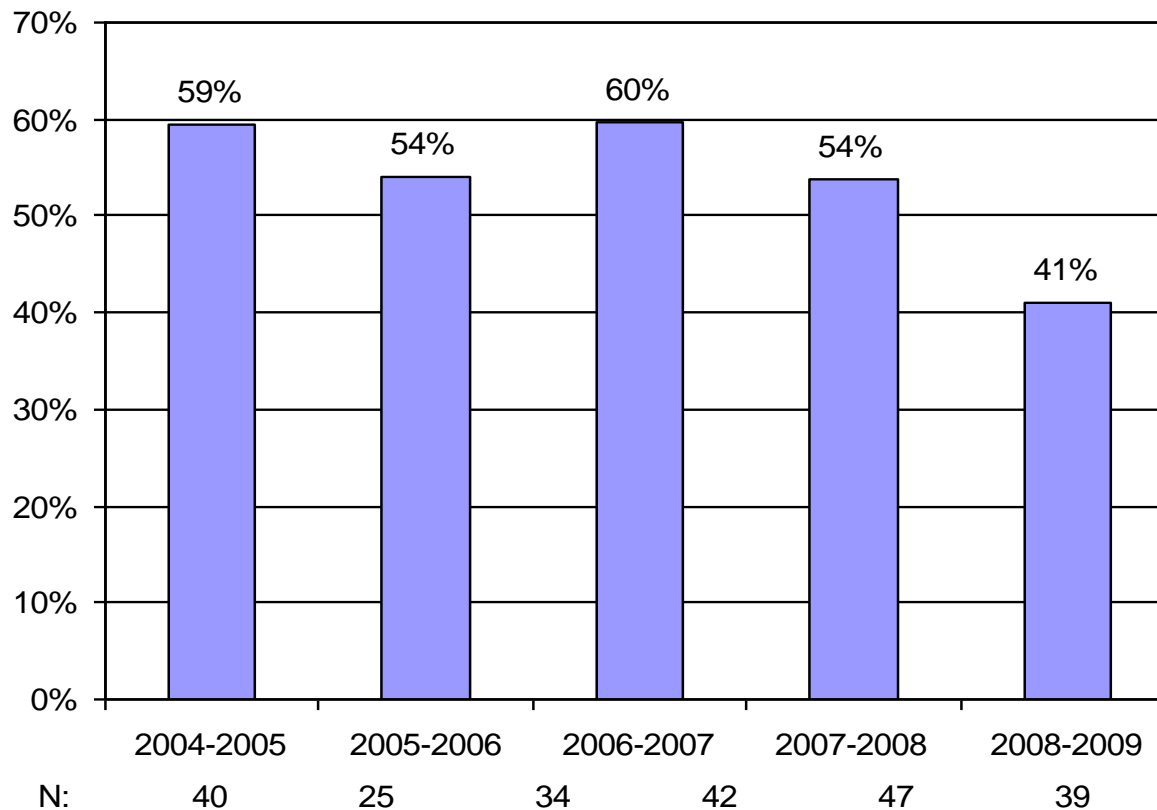
- Inpatient Day Team seniors work 7A-9P M-F (except Continuity Day) with 3 golden weekends
- Seniors must discuss new admissions with responsible attending before hand-off to incoming Day/Night Team senior
- Computerized patient flowsheets updated twice daily
- Chief Resident supervises AM inpatient hand-offs Monday - Sunday
- Director of Inpatient Services at UH discusses all new and problem inpatients with Chief Resident Monday-Sunday

Scheduling Differences: Internal Medicine

- 24-hour call eliminated except in ICU
- 4 ICU teams on call q4 excused by 11am post call
- 4 Inpatient Day Teams work 7AM to 5PM
- Admit every 4th day until 5PM, excused at 8PM
- Night float coverage of inpatients and admissions
 - PL1 Night float 8AM-8PM for 2 week block
 - PL 2/3 Night float 4PM-12AM and 8PM-8AM for 2 week block
 - Weekend coverage (Fri and Sat) by elective residents
 - Admitting resident evaluates all potential admissions during a 12 hour shift
- Medical Consult residents (12 hour shifts) control all admissions and consults

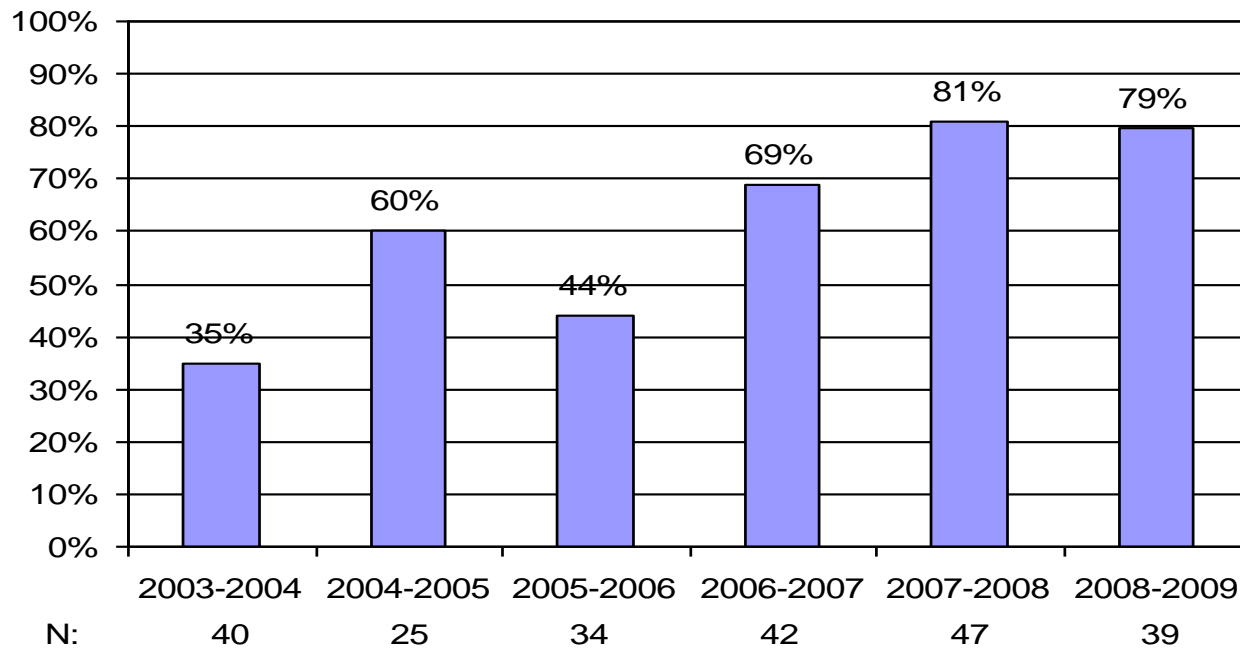
Percentage of Pediatric Residents Reporting MVA and/or Near Misses from AY 2004-05 to 2008-09

Scale: 1=0 MVAs/near-misses, 2=1 MVA/near-miss, 3=2 MVAs/near misses, 4=3 MVAs/near-misses, and 5= >3 MVAs/near-misses. (p = .042)



Percentage of Pediatric Residents Rating their Satisfaction as Very Good or Excellent with the Night Team Program from AY 2004-2005 to 2008-2009

Scale: 1=Excellent, 2=Very Good, 3=Satisfactory, 4=Less Than Expected and 5=Needs Much Improvement. (p < .001)





What Didn't Work

- 4 weeks consecutive Night Team
- Brief shifting from nights to days and back again
- Different Night Team start times for different days of the week
- One hour for turnovers
- Maintaining day-awake lifestyle during Night Team assignments
- Ongoing challenge: Timing of medication for residents with ADHD



Residency training with restriction to 14 consecutive duty hours is effective and well-accepted.

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