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

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APPD Annual Meeting
April 2, 2011
Disclosure Information

- In the past 12 months, we have no relevant financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial services.

- This presentation will not include discussion of pharmaceuticals or devices that have not been approved by the FDA.
Current (2003) 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
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
  - 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

- 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

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

Change is coming…

Clear and compelling evidence that 2003 ACGME duty hours standards have not fully achieved intended goals of improving safety and well-being of patients and residents

2011 ACGME Duty Hours Standards

- Maximum 80 hours/wk, averaged over 4 wks
- PL-1 may not exceed 16 consecutive hours of work
- PL-2 and above: may not exceed 24+4 hrs
- Average in-house call not more frequent than every 3rd night
- Strategic nap at night strongly suggested if working more than 16 consecutive hours
2011 ACGME Duty Hours Standards

- Night float maximum 6 consecutive nights
- Minimum time between shifts:
  - Should have 10 hours
  - Must have 8 hours
  - Must have 14 hours after a 24-hour shift
- 1 day in 7 duty-free, averaged over 4 weeks

http://acgme.org/acWebsite/home/Common_Program_Requirements_07012011.pdf
**Pediatric RRC “Night” Definitions**

**Night Float**
- Episodic coverage of patients only at night, basically residents covering another service during the day
- Limited to one consecutive week, not more than 4 wks/yr

**Night shift**
- Scheduled series of nights to provide consistent care at night that mirrors day shift
- No specified limit by the RRC
- Need educational component and appropriate balance between day and night responsibilities
- More to come on appropriate ratio of day to night experiences

**Night call**
- Those working in the day who also stay at night to provide coverage

Upping the ante…

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 the drive home from work.

Why did we change?

UCSD NICU Fellowship

- 2003 Duty Hours Limitations
- Traditional 1 in 4 call schedule with 30 hour limitation (24+6)
- Post-call fellow off and NICU covered by another fellow

**Problem:** Limited continuity of care
Subspecialty Training

- Clinical time
- Scholarly activity
- Developing life-long learning habits
Schedule Re-Engineering: The Art (Worksheet A – 20 minutes)

1. Who are the stakeholders whose buy-in is needed to ensure success of any schedule change?

2. What are the barriers to successful implementation of a schedule without 24-hour call?

3. What are the anticipated effects on education, patient care, hand-offs, supervision, etc?

4. How would you approach developing consensus among stakeholders?
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

<table>
<thead>
<tr>
<th>Service</th>
<th># Seniors Daytime</th>
<th># Seniors On-Call Overnight</th>
<th># Juniors Daytime</th>
<th># Juniors On-Call Overnight</th>
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<tbody>
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<td>Inpatient</td>
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<td>ICU - 2</td>
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Re-Designing the Annual Master: Eliminating 24-Hour Call

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<tr>
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<th># Months</th>
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<tr>
<td><strong>Night Team/Senior</strong></td>
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<td><strong>Inpatient</strong></td>
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<td>12 x J #Juniors</td>
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<tr>
<td><strong>ICU – 1</strong></td>
<td>12 x E #Seniors</td>
<td>12 x K #Juniors</td>
</tr>
<tr>
<td><strong>ICU - 2</strong></td>
<td>12 x F #Seniors</td>
<td>12 x L #Juniors</td>
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Re-Designing the Annual Master: Scheduling Considerations

- Daytime staffing # = current N -1 for services with traditional every 4\textsuperscript{th} 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?
Worksheet B
(20 minutes)
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 with 10-hour break
- 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

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<td>PL-2</td>
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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

<table>
<thead>
<tr>
<th>UNIVERSITY HOSPITAL</th>
<th>DEPARTMENT OF PEDIATRICS</th>
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<tbody>
<tr>
<td>INPATIENT and CRITICAL CARE SERVICES</td>
<td>APRIL 2011</td>
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<tr>
<th>F-BLUE</th>
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<tr>
<td>7A–9P M-F</td>
<td>7A–7P M-F</td>
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<td>8A–9P Sat, Sun, Hol</td>
<td>6P-8A</td>
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<tr>
<td>7:30P–9:30A M-F</td>
<td>7:30P–9A Sat, Sun, Hol</td>
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<td>8A–8P Sat, Sun, Hol</td>
<td>7P-9A</td>
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### Scheduled Inpatient Work Hours

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<tr>
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<th>DAY TEAM</th>
<th>NIGHT TEAM</th>
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<tbody>
<tr>
<td><strong>Senior Residents</strong></td>
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<tr>
<td>Weekdays</td>
<td>7AM-9PM except Continuity Day 7AM-5PM</td>
<td>7:30PM-9:30AM</td>
</tr>
<tr>
<td>Weekends/Holiday</td>
<td>8AM-9PM</td>
<td>7:30PM-9:00AM</td>
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<tr>
<td><strong>Junior Residents</strong></td>
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<tr>
<td>Weekdays</td>
<td>7AM-5PM with ‘long call 5PM-9PM mean Q3</td>
<td>7:30PM-9:30AM</td>
</tr>
<tr>
<td>Weekends/Holiday</td>
<td>8AM-9PM</td>
<td>7:30PM-9:00AM</td>
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# Scheduled Work Hours

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

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

- Shared ‘ownership’ of patients by Day and Night Team residents
- 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 flow sheets updated 2x/day
- Attendings round and write notes daily
- Director of Inpatient Services at UH discusses all new and problem inpatients with Chief Resident Monday-Sunday
Continuity of Learning

- Day Team residents now present physically and mentally for 3 daily scheduled teaching hours.
- Night Team residents attend Morning Report 8:30-9:30 AM daily.
- Residents on required subspecialty/elective present all day, every day Monday-Friday.
- No call Monday-Thursday for PL-3s on required subspecialty/elective rotations.
- No statistically significant difference in mean ABP Certifying Examination score ($p = 0.45$).
Inpatient Hand-offs

- Allotted 90 minutes (sometimes excessive)
- Attended by junior and senior residents
- Verbal, face-to-face, 14-16 per week
- Supplemented by computerized Word documents updated twice daily (responsible attending, PCP, contact info, diagnoses, lab results, treatment, what to do/follow)
- Supervised by Chief Resident 7 days/wk at primary site (AM), 5 days/wk at 2nd site (AM)
Other Outcomes

- Fewer residents reporting MVA and/or near-misses (p=0.042)
- Increased resident satisfaction with Night Team system (p<0.001)
- Steadily decreasing inpatient length of stay
- No increase re-admissions within 30 days or mortalities
- No increase in resident complement
- No substitute providers hired
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
Scheduling Differences: Internal Medicine

- 24-hour call eliminated including ICU
- 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
- Medical Consult residents (12 hour shifts) control all admissions and consults
MICU/CCU

- 4 teams of 1 senior & 1 intern
  - 1 team covering CCU (2 week assignment)
  - 2 teams covering MICU
  - 1 night team (6 night assignment)

- Switch on weekend
  - Internal coverage of weekend nights

- Assigned days off
UCSD NICU Fellowship

- 2007 Schedule Change
  - Day Fellow on 6 days/wk, no nights
    - 7 AM-6:30 PM
  - Night Fellows on 2-3 nights in a row, no daytime responsibilities
    - 6 PM-7:30 AM
  - 3 week blocks
Fellow Schedules at a Glance

Traditional

<table>
<thead>
<tr>
<th></th>
<th>Sun</th>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
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New Schedule

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<td>conference</td>
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## Time for Scholarly Activities

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<thead>
<tr>
<th></th>
<th>Traditional Call</th>
<th>Shift System</th>
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<tbody>
<tr>
<td>First Year</td>
<td>78 Days</td>
<td>69 Days</td>
</tr>
<tr>
<td>Second Year</td>
<td>98 Days</td>
<td>111 Days</td>
</tr>
<tr>
<td>Third Year</td>
<td>138 Days</td>
<td>134 Days</td>
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Advantages of Shift System

- Continuity of Care (days and nights)
- Number of Hand-offs
- Fatigue
- Education
  - Life-long learning habits
Residency and fellowship training with restriction to 14 consecutive duty hours is effective and well-accepted.
REFERENCES

11. Roey S. Medical education and the ACGME duty hour requirements: assessing the effect of a day float system on educational activities. Teach Learn Med. 2006;18:28-34.
REFERENCES


