Nighttime ICU Physician Staffing

Scott D. Halpern, M.D., Ph.D.

Assistant Professor of Medicine, Epidemiology, and Medical Ethics & Health Policy
Director, Fostering Improvement in End-of-Life Decision Science (FIELDS) program
Deputy Director, Center for Health Incentives and Behavioral Economics (CHIBE)
Intensivist staffing

- Most studies suggest benefits to intensivist-led care (no RCTs)
  Pronovost P, et al. JAMA 2002

- Greater intensivist exposure = greater benefits still?

- Rapid diffusion of nighttime intensivists in U.S. (roughly 1/3 of U.S. academic ICUs), and dominant model in Europe (3/4 ICUs)
Quasi-experimental studies → mixed results

Out-of-hours consultant cover and case-mix-adjusted mortality in intensive care
Mark C Blunt, Kenneth R Burchett
Lancet 2000; 356: 735-6

Effect of 24-hour mandatory versus on-demand critical care specialist presence on quality of care and family and provider satisfaction in the intensive care unit of a teaching hospital
Ognjen Gajic, MD, MSc; Bekele Afessa, MD; Andrew C. Hanson, BS; Tami Krpata; Murat Yilmaz, MD; Shehab F. Mohamed, MBBS; Jeffrey T. Rabatin, MD, MSc; Laura K. Everson, MS, RN, CNS, APRN-BC, CCRN; Timothy R. Aksamit, MD; Steve G. Peters, MD; Rolf D. Hubmayr, MD; Mark E. Wylam, MD
Crit Care Med 2008; 36:36–44

Twenty-four-Hour Intensivist Presence
A Pilot Study of Effects on Intensive Care Unit Patients, Families, Doctors, and Nurses
Allan Garland¹, Dan Roberts¹, and Lesley Graff¹
Am J Respir Crit Care Med Vol 185, Iss. 7, pp 738–743
2 Multicenter Observational Studies

- 65,752 patients admitted to 49 ICUs in APACHE database ’09-’10
  - Mortality effect with low-intensity daytime staffing: $0.62 (0.39 – 0.97)$
  - Mortality effect with high-intensity daytime staffing: $1.08 (0.63 – 1.84)$
  - $P = 0.02$

- 271,611 patients admitted to 155 ICUs in Project IMPACT database ’01-’09
  - Mortality effect with low-intensity daytime staffing: $1.02 (0.92 – 1.14)$
  - Mortality effect with high-intensity daytime staffing: $0.90 (0.68 – 1.20)$
  - $P = 0.68$

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Kerlin MP, et al. AJRCCM 2013; A5320
Two more studies from this year


A Randomized Trial of Nighttime Physician Staffing in an Intensive Care Unit


NCT 01434823
Study Design

• RCT of 2 nighttime staffing models in the 24-bed UPenn MICU:
  – Control: in-hospital residents, daytime attending & fellow on home call
  – Intervention: 7pm to 7am in-hospital intensivist plus same resident coverage; daytime attending and fellow off duty

• Random assignment of 7-day blocks (Mon - Sun) to control vs. intervention stratified within 2-week daytime intensivist blocks

• Primary exposure: staffing on night of or following ICU admission
  – Control: median coverage proportion: 0% (0% - 33%)
  – Intervention: median coverage proportion: 100% (67% - 100%)
Outcomes

• Primary outcome: length of stay in the ICU (time to ICU discharge)

• Secondary outcomes:
  – Hospital length of stay
  – ICU mortality (including inpatient hospice transfers)
  – Hospital mortality
  – Discharge home from hospital
  – ICU readmission within 48 hours of ICU discharge

• Newly admitted patients enrolled from 9/11 - 9/12

• Of 175 nights randomized to intervention, 166 (95%) actually covered
  • Intention-to-treat analyses

• 60% of patients admitted at night

Kerlin MP, et al. (under review)
No effect on primary outcome: ICU LOS

Rate ratio: 0.98 (0.88 – 1.09)

Rate ratio: 0.98 (0.84 – 1.13)

Censoring events: death, transfer to another ICU

No effect on any secondary outcome

<table>
<thead>
<tr>
<th></th>
<th>Intervention (median)</th>
<th>Control (median)</th>
<th>Rate ratio (95% CI)</th>
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</thead>
<tbody>
<tr>
<td>Hospital length of stay</td>
<td>7.2 days</td>
<td>6.9 days</td>
<td>0.91 (0.82-1.02)</td>
</tr>
<tr>
<td>ICU mortality</td>
<td>154 (19%)</td>
<td>139 (18%)</td>
<td>1.07 (0.90-1.28)</td>
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<tr>
<td>Hospital mortality</td>
<td>203 (25%)</td>
<td>177 (23%)</td>
<td>1.08 (0.93-1.25)</td>
</tr>
<tr>
<td>Discharge home</td>
<td>317 (39%)</td>
<td>314 (40%)</td>
<td>0.95 (0.85-1.07)</td>
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<tr>
<td>ICU readmissions in 48 hours</td>
<td>32 (5%)</td>
<td>21 (3%)</td>
<td>1.56 (0.84-2.89)</td>
</tr>
</tbody>
</table>
Residents’ perceptions of education

<table>
<thead>
<tr>
<th>Survey statement</th>
<th>Score*</th>
<th>Agreement*</th>
</tr>
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<tbody>
<tr>
<td>“I had enough autonomy on nights when the nocturnal intensivist was available.”</td>
<td>73 (23)</td>
<td>28 (68)</td>
</tr>
<tr>
<td>“The presence of a nocturnal intensivist made me feel more supported in my decisions than I have felt on nights that have not been covered by nocturnal intensivists.”</td>
<td>77 (24)</td>
<td>32 (78)</td>
</tr>
<tr>
<td>“The presence of a nocturnal intensivist improved the quality of my educational experience in the MICU at night.”</td>
<td>75 (23)</td>
<td>28 (68)</td>
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</tbody>
</table>

Kerlin MP, et al. (under review)
Limitations and Implications

- Generalizability: single center, reasonably well-trained residents, high-intensity daytime staffing

- Some potentially important outcomes were not assessed:
  - Family satisfaction
  - ICU physician burnout
  - Nursing perceptions of quality / satisfaction
  - Objectively measured educational outcomes
  - Lawsuits
Conclusions

• Nighttime intensivists provide no direct patient benefits in ICUs with high-intensity daytime staffing

• Uncertain whether nighttime intensivists provide benefits in ICUs with low-intensity daytime staffing
  - Better to use limited resources to augment daytime staffing?

• Mixed, low-quality data regarding effects on trainee education, family satisfaction, and provider quality of life
  - Need to weigh against incremental costs and siphoning of intensivists
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chibe.upenn.edu/fields-program
shalpern@exchange.upenn.edu
Primary effects on ICU LOS were robust

No effect modification by severity of illness or admission during “July effect” period