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FOR MORE INFORMATION, CONTACT:

Dacia Morris

dmorris@thoracic.org

ATS Office: 212-315-8620 (until May 11)

Cell Phone: 917-561-6545

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Session: D102 Figuring Out What We Don't Know: Advances in Medical Education

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Location: Room 304 (South Building, Esplanade Level), MOSCONE CENTER

Monthly Resident Handoff of Patients May Increase Risk of Dying

ATS 2016, SAN FRANCISCO – Transitions in care that occur when medical residents leave a clinical rotation and turn their patients' care over to another resident is associated with increased mortality, according to new research presented at the ATS 2016 International Conference.

According to lead researcher Joshua Denson, MD, a fellow in pulmonary and critical care medicine at the University of Colorado, previous studies have looked at adverse outcomes associated with the daily shift changes that occur in the hospital, but few studies have looked at the "more permanent" handoffs that occur on a monthly basis at academic hospitals, where residents train by moving through a series of clinical assignments. Those studies that have looked at resident handoffs, he said, were not large enough to reach conclusions about patient mortality.

"Most hospitals have guidelines for the handoffs that occur on a daily basis, and usually those handoffs include a face-to-face discussion between doctors about what will happen to the patient during the next shift," Dr. Denson said. "But few have guidelines for this monthly handoff, in which a resident turns over for good the care of 10 to 20 patients, often in an email or telephone conversation."

Dr. Denson, who was chief resident at New York University when the study was conducted, worked with colleagues to review 230,701 internal medicine patient discharges from 10 Veterans Administration hospitals between 2008 and 2014.

Researchers identified 63,911 patients who died or were discharged from the hospital within 7 days of experiencing a transition in care from an intern (a first-year medical resident), resident or both an intern and resident. All other discharges served as the control for each of the three handoff groups. Researchers also looked at 30-day and 90-day mortality rates following discharge.

Among patients in the 3 handoff groups, researchers found a:

- 64 to 95 percent increase in in-hospital mortality.
- 76 to 82 percent increase in 30-day mortality.
- 72 to 84 percent increase in 90-day mortality.

Researchers then adjusted for potential confounding factors, including age, comorbidities, length of stay and race and ethnicity. They found that the associations between 30-day and 90-day mortality and the 3 types of handoffs remained statistically significant. In-hospital mortality remained statistically significant only for intern handoffs. Researchers said study outcomes were similar across the 10 hospitals.

Dr. Denson said the stronger 30-day and 90-day mortality findings were a surprise. He speculated that the transition in care could lead to medication or other discharge errors because the new intern or resident lacked a complete picture of the patient. But, he added, “We don’t know the root cause of this.”

“Transitions in care are common, they are not preventable, and they can be dangerous, particularly those that occur at the end of a resident’s clinical rotation,” he said. “We need high-quality research to make them safer.”

Contact for study: Joshua Denson, MD, joshua.denson@ucdenver.edu

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Abstract 9207

Increased Mortality Associated with Resident Handoff in a Multi-Center Cohort

J. L. Denson¹, A. Jensen², H. Saag³, B. Wang³, Y. Fang³, L. Horwitz³, L. Evans⁴, S. Sherman²

¹University of Colorado at Denver - Denver, CO/US, ²VA New York Harbor Healthcare System, New York University - New York, NY/US, ³New York University - New York, NY/US, ⁴New York University School of Medicine - New York, NY/US

Rationale: Medical errors following transition in care are associated with adverse events, and may be associated with increased mortality. We aimed to investigate if end-of-month resident handoff was associated with increased mortality.

Methods: A multi-center retrospective cohort study of adult medical patients discharged from 10 academic Veterans' Affairs Medical Centers from July 1, 2008 to June 30, 2014. Discharges were divided into a handoff and control group for each residency program. Handoff groups include discharges within 7 days following end-of-month resident handoff and admission prior to that handoff date. All other discharges were controls. These two cohorts were stratified by type of handoff: intern only, resident only, or both intern/resident. Outcomes included in-hospital, 30-day, and 90-day mortality. Adjusted confounders included age, sex, race, ethnicity, length of stay, calendar month, and Elixhauser Comorbidity Index.

Results: Among 230,701 patient discharges, 25,938 were exposed to intern handoff, 26,456 were exposed to resident handoff, and 11,517 were exposed to both intern and resident handoff. 95.8% were men with a mean age of 65.6 years. Average length of stay was 4.2 days. Unadjusted hospital mortality was significantly greater for all handoff groups: intern handoff (3.5% vs 2.0%, $p<0.0001$, OR 1.77 [95% CI 1.58-1.98]), resident handoff (3.3% vs 2.0%, $p<0.0001$, OR 1.64 [1.46-1.83]), and combined intern/resident handoff (4.0% vs 2.1%, $p<0.0001$, OR 1.95 [1.63-2.33]). Following risk adjustment, only patients exposed to intern handoff alone remained at greater risk with a statistically significant association (adjusted OR 1.14, $p<0.0001$). 30-day unadjusted mortality was significantly increased for patients exposed to intern handoff (9.7% vs. 5.7% $p<0.0001$, OR 1.80 [1.69-1.91]), resident handoff (9.6% vs. 5.7% $p<0.0001$, OR 1.76 [1.64-1.88]), and combined intern/resident handoff (10.3% vs. 5.9% $p<0.0001$, OR 1.82 [1.62-2.06]). Notably, all three groups remained significant in multivariate analyses (adjusted OR 1.20 $p<0.0001$, adjusted OR 1.15 $p<0.0001$, adjusted OR 1.10 $p<0.05$, respectively). 90-day unadjusted mortality was also increased for all groups: intern handoff (15.9% vs. 9.9% $p<0.0001$, OR 1.72 [1.61-1.84]), resident handoff (15.7% vs. 9.9% $p<0.0001$, OR 1.70 [1.58-1.82]), and combined intern/resident handoff (16.7% vs. 10.2% $p<0.0001$, OR 1.09 [1.02-1.17]). Following adjustment, all groups remained statistically significant (adjusted OR 1.17, $p<0.0001$, adjusted OR 1.14, $p<0.0001$, adjusted OR 1.09, $p<0.05$, respectively).

Conclusions: Resident physician handoff was significantly associated with an increase in hospital, 30-day, and 90-day mortality. Interestingly, the degree of adjusted mortality risk was strongest for patients exposed to only intern handoff suggesting that level of training may be a contributing factor.

Table 2. All-cause hospital and long term mortalities in handoff patients vs. control patients

Outcomes	Handoff	Control	OR (95% CI)	Adjusted OR†
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All-cause hospital Mortality (%)

Intern Handoff	907 (3.5%)	4112 (2.0%)	1.77 (1.58- 1.98)***	1.14 (1.07- 1.21)***
Resident Handoff	868 (3.3%)	4151 (2.0%)	1.64 (1.46- 1.83)***	1.05 (0.97- 1.41)
Intern & Resident Handoff	458 (4.0%)	4561 (2.1%)	1.95 (1.63- 2.33)***	1.17 (0.97- 1.41)

30-Day Mortality (%)

Intern Handoff	1114 (9.7%)	5157 (5.7%)	1.80 (1.69- 1.91)***	1.20 (1.15- 1.26)***
Resident Handoff	1112 (9.6%)	5159 (5.7%)	1.76 (1.64- 1.88)***	1.15 (1.08- 1.22)***
Intern & Resident Handoff	537 (10.3%)	5734 (5.9%)	1.82 (1.62- 2.06)***	1.10 (1.00- 1.22)*

90-Day Mortality (%)

Intern Handoff	1816 (15.9%)	9010 (9.9%)	1.72 (1.61- 1.84)***	1.17 (1.12- 1.23)***
Resident Handoff	1827 (15.7%)	8999 (9.9%)	1.70 (1.58- 1.82)***	1.14 (1.08- 1.19)***
Intern & Resident Handoff	876 (16.7%)	9950 (10.2%)	1.76 (1.61- 1.93)***	1.09 (1.02- 1.17)*

* indicates p-value <0.05; *** indicates p-value <0.0001; absence of asterisk indicates p-value >0.05

† Multivariate Logistic Regression Model
adjusted for Age, Sex, Race, Ethnicity, Length of
Stay (outliers >99% deleted), Calendar Month,
and Elixhauser Comorbidity Index