



IMPROVING INTERN EFFICIENCY THROUGH LAPTOP BASED ROUNDING IN FLOW

**HEATHER BALCH, MD, CASEY GRADICK, MD/MPH, POLINA KUKHAREVA, PHD,
NATHAN WANNER, MD**

DEPARTMENT OF GENERAL INTERNAL MEDICINE

UNIVERSITY OF UTAH

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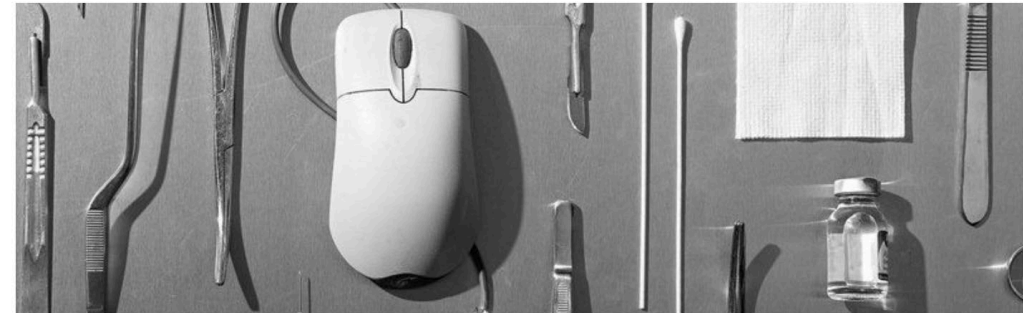
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CONFLICT OF INTEREST DISCLOSURES

- The authors have no conflicts of interest to disclose

INTRODUCTION

- Work hour restrictions and EHR's have changed the way we spend our work day
- Lots of redundancy
- With limited duty hours, desire to increase efficiency
 - Faster orders, earlier notes, and patient discharge
 - Increase teaching time, patient face time, improve duty hour compliance and resident wellness



POLITICS HEALTH

Death by a Thousand Clicks: Where Electronic Health Records Went Wrong

The U.S. government claimed that turning American medical charts into electronic records would make health care better, safer, and cheaper. Ten years and \$36 billion later, the system is an unholy mess.

Research Shows Link Between EHR and Physician Burnout

The Hospitalist. 2016 April;2016(4)

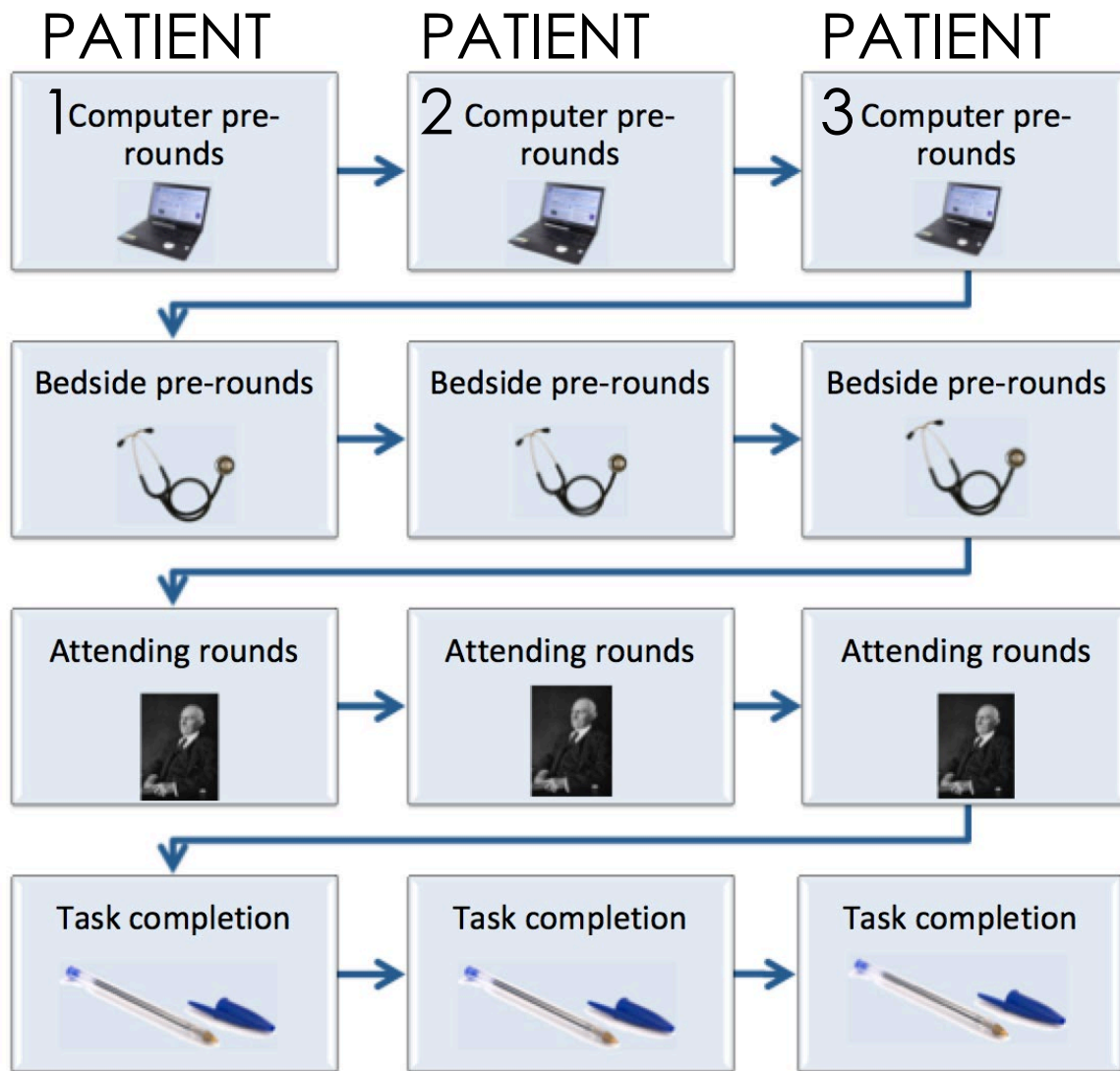
Author(s): [Larry Beresford](#)

INTRODUCTION - HOW DO RESIDENTS SPEND THEIR DAY?

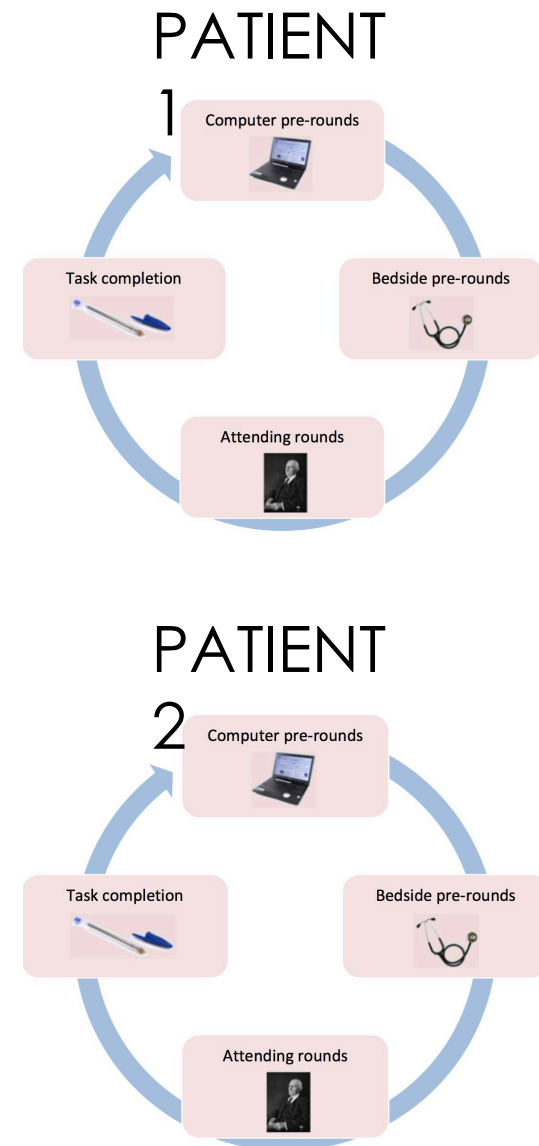
- Resident survey
- Previous time-in-motion studies⁽¹⁻⁶⁾
 - 9-16% of time with patients
 - 40-50% on computer
 - 20-30% Communicating with other providers
 - 6-11% in transit¹
 - 11-14% on education (rounds often included in education time)

	Average From All 14 Intern Days
Patient census	5
Patient time	1:58:45
Avg time/patient	0:23:16
Total computer time	5:01:37
Writing notes	2:45:43
Chart review	1:32:11
Entering orders	0:39:33
Total comm time	2:20:15
Education	1:18:32
Total time	11:28:26

BATCHED ROUNDING



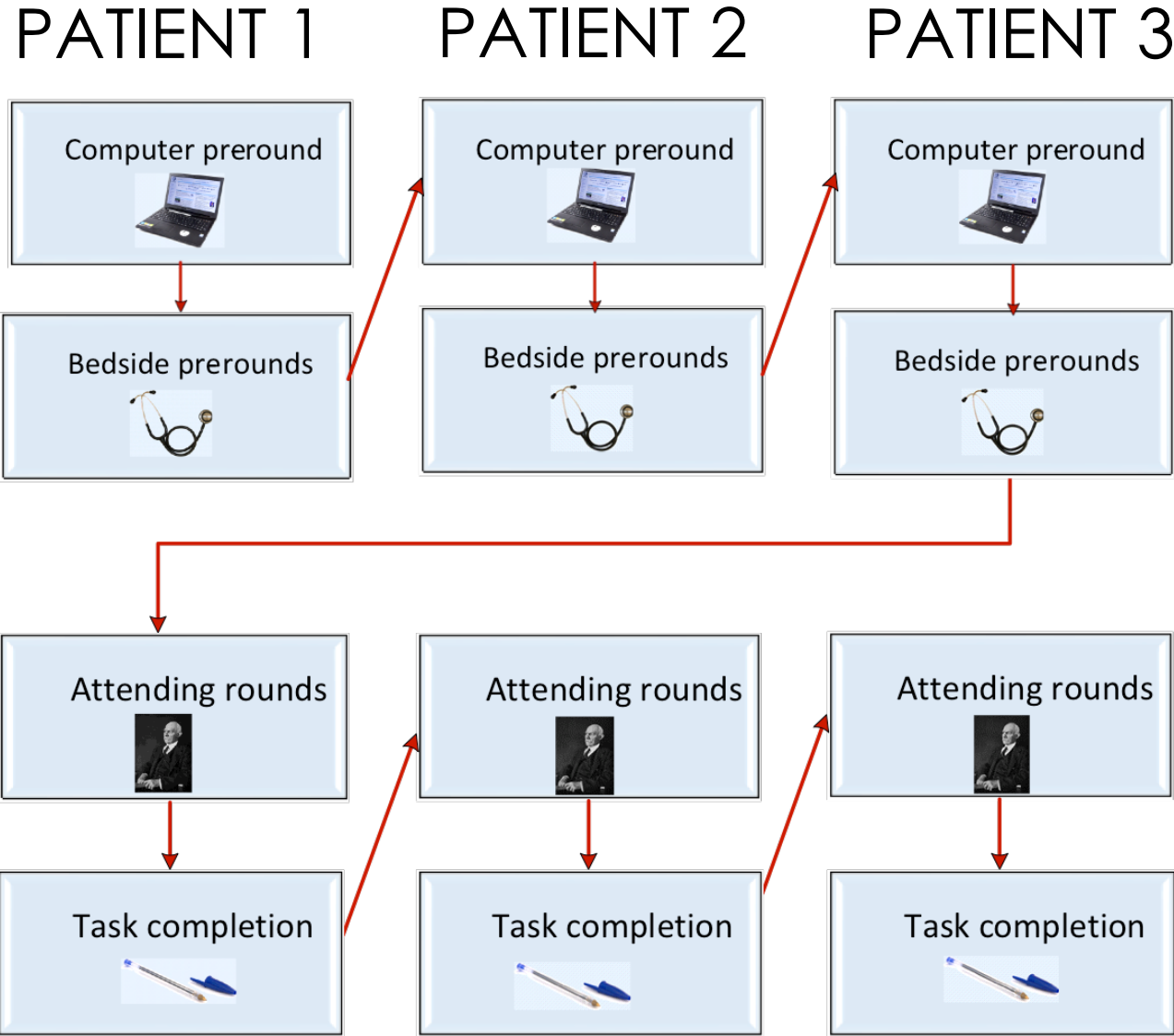
ROUNDING IN FLOW



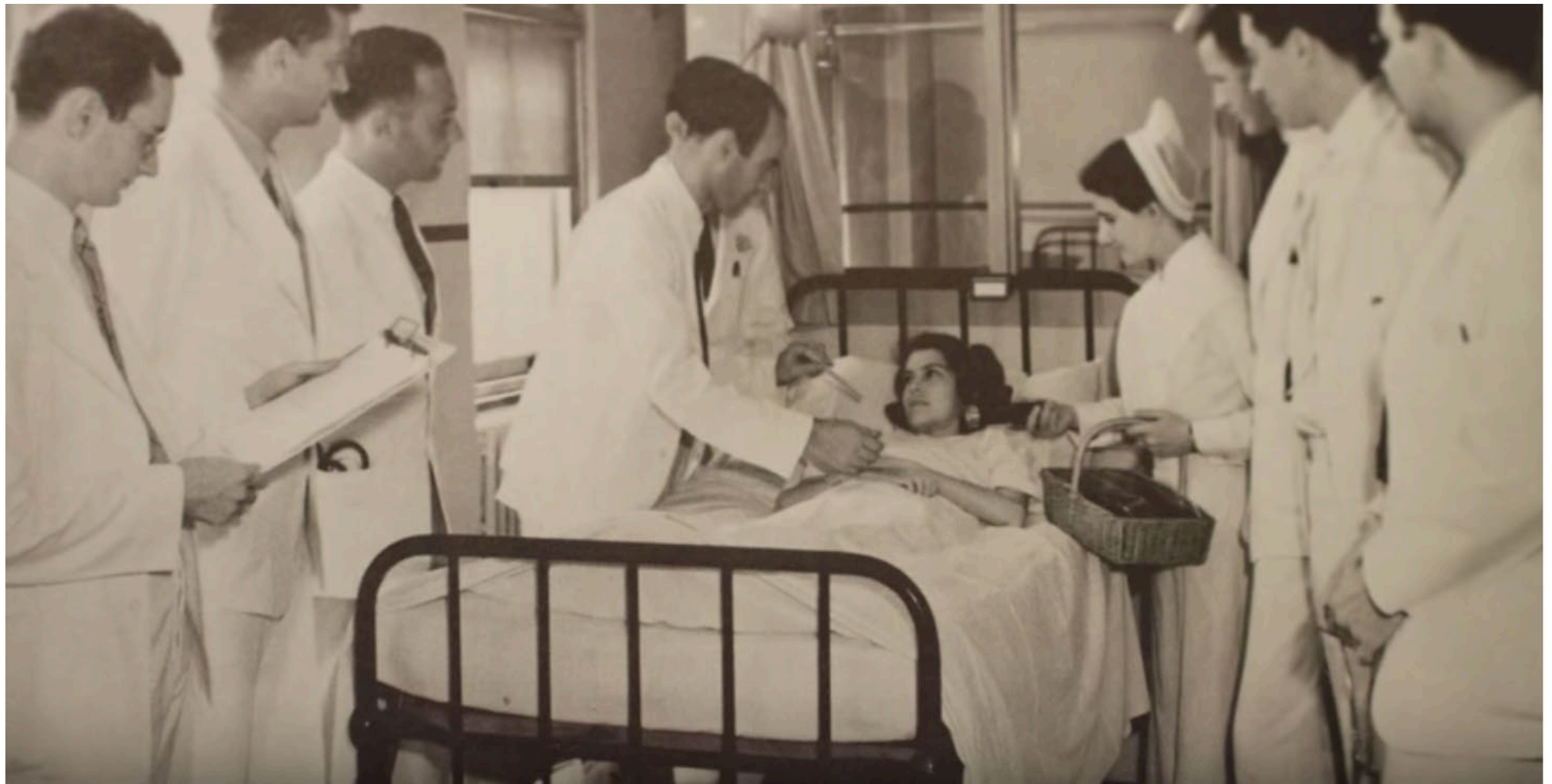
STUDY DESIGN

- 3 IM Resident Teams
 - Structure: 2 interns, 1 resident and attending
- Intervention:
 - 3 laptops provided to intervention team
 - Rounded in modified flow w/reduced batching → orders and progress notes done on rounds, but interns still pre-rounded beforehand
 - 1-3 patients, then switched. Other intern present for teaching
 - Controls were other two teams (one fickle, bulky desktop, no laptops)

UNIV OF UTAH MODIFIED ROUNDING IN FLOW WITH DECREASED BATCHING



NEW/OLD WORKFLOW



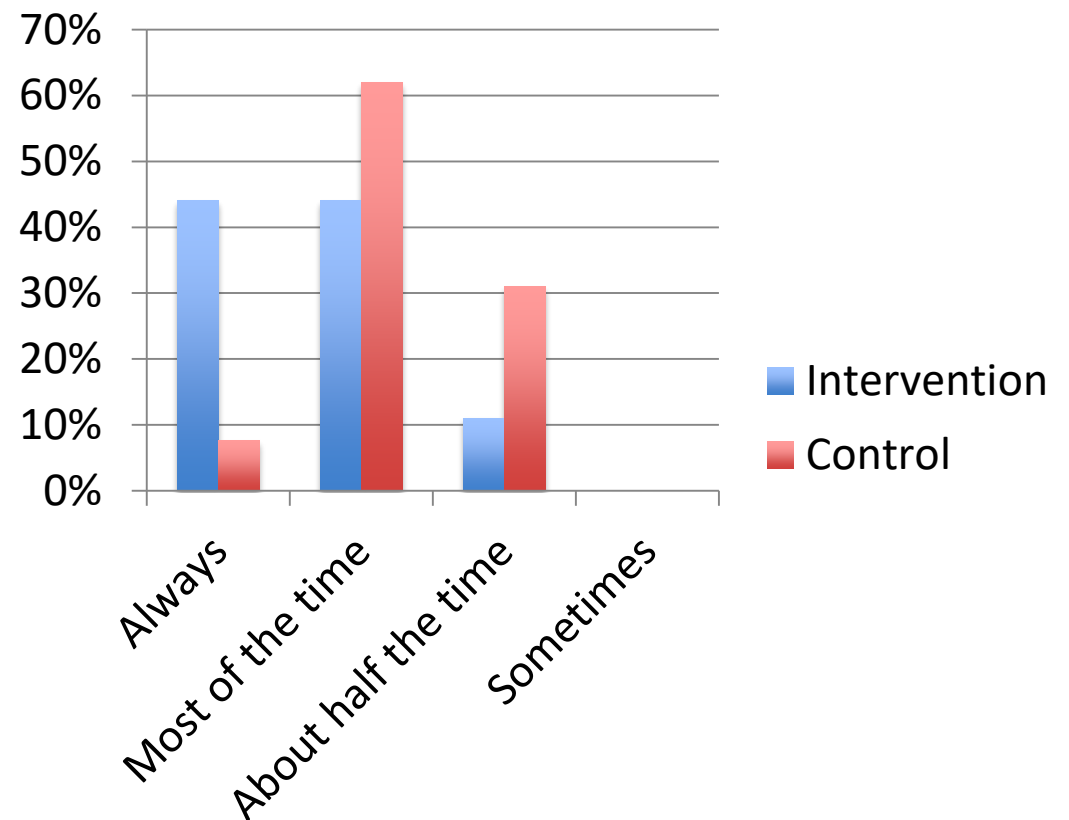
MEASURES/OUTCOMES

- EHR orders and notes study (3 mo)
 - Timestamp on progress notes, orders, d/c summaries
 - Controlled for patient census per intern
 - Logistic regression
- Time in motion study
- Resident, intern and attending surveys
- Duty hours

RESULTS: SURVEY- DID RESIDENTS LIKE IT?

- “If you were on Team 2, how helpful or unhelpful was it to have a personal laptop to use on pre-rounds and rounds?
 - Very helpful: 90%
- “If you were on Team 2, how much more efficient or inefficient was your workflow using a laptop on rounds/prerounds compared to other rotations?”
 - Much more efficient: 80%

- “How often did you leave the hospital by 7 pm with your work done?”



RESULTS: SURVEY- DID RESIDENTS LIKE IT?

- *Allows the other intern to be part of rounds even if they are not presenting.*
- *It was amazing to have the laptops for everyone on rounds.*
- *It saved a lot of time even in comparison to split rounds*
- *It allowed me to pre-round and round efficiently without wasting time transposing information.*
- *All my notes were prepped before rounds and then I could use them to present on my patient straight from my computer.*
- *I actually felt like I knew my patients information better because I had more time to see them and think about them*

TIME-IN-MOTION STUDY RESULTS

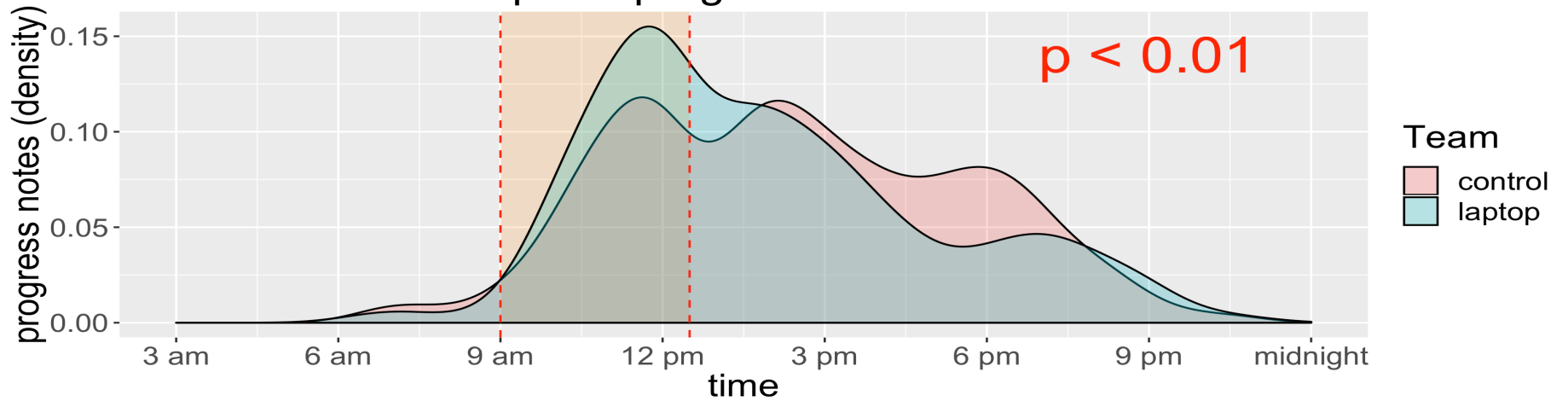
Outcome	Control	Laptop	Difference w/laptop (%)	P value
Number of days	7	7		
Resident census per day, mean	4.9	5.7		0.3
Patient time, mean, minutes	105	128	+22%	0.37
Patient time per patient, mean, min	21	26	+25%	0.33
Computer time, mean, min	306	289	-6%	0.71
Communication time, mean, min	150	129	-14%	0.45
Education time, mean, min	69	88	+27%	0.41
Movement time, mean, min	32	35	+ 10%	0.73
Time, total, mean, min	684	692	+1%	0.89

EHR ORDERS AND NOTES STUDY RESULTS

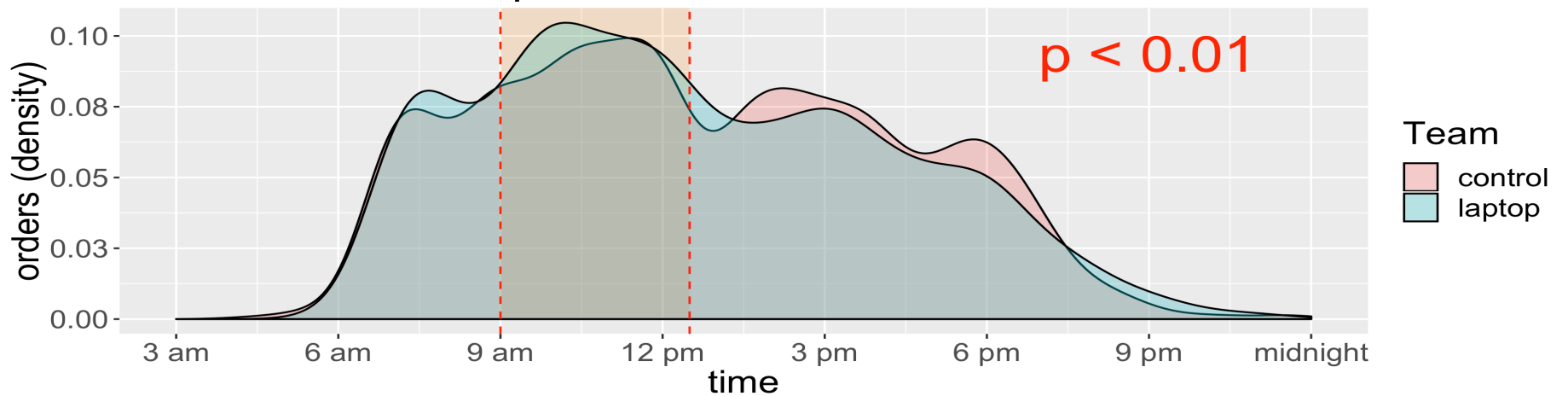
STUDY TEAM CHARACTERISTICS

Outcome	Control	Laptop
Number of visits, n	680	386
Number of residents, n	34	20
Number of progress notes, n	1659	871
Number of orders, n (excluding d/c orders)	8509	3729
Number of discharge orders, n	434	238

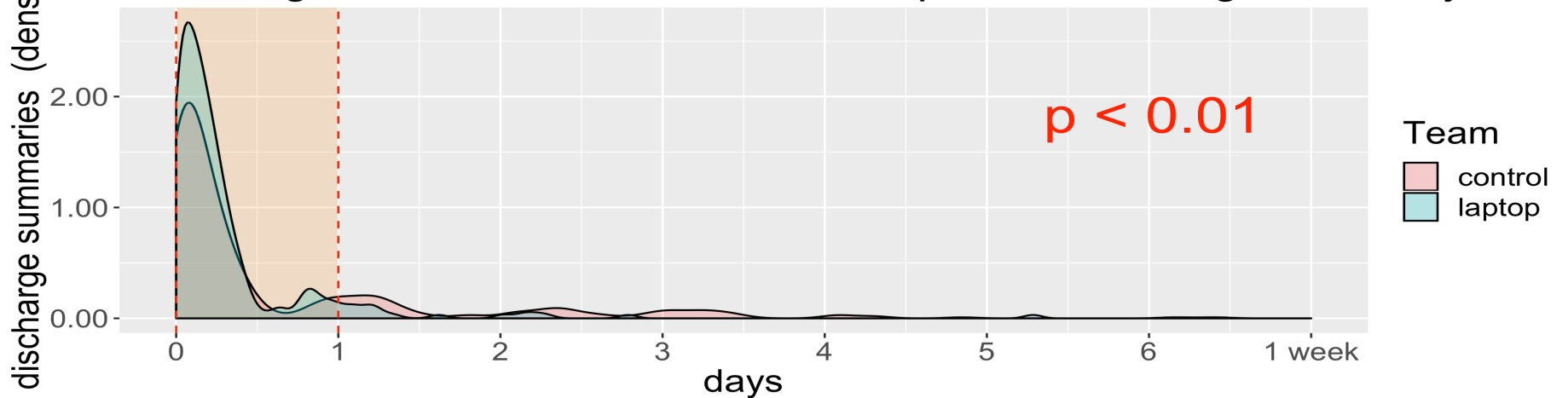
When do residents place progress notes?



When do residents place orders?



How long does it take a resident to complete a discharge summary?



EHR ORDERS AND NOTES STUDY RESULTS

UNADJUSTED ANALYSIS

Outcome	Control	Laptop	P-value
Resident census per day, mean (SD)	5.2 (2.0)	4.5 (1.9)	<0.01
Progress notes placed during rounds, %	31	41	<0.01
Orders placed during rounds, %	33	36	<0.01
D/C summaries within 24 hrs from order, %	79	94	<0.01

P-VALUE IS BASED ON T-TEST.

LOGISTIC REGRESSION ANALYSIS – ADJUSTED FOR CENSUS

Outcome	Control	Laptop	Odds Ratio	P-value
Resident census per day, mean	5.2	4.5		<0.001
Progress notes placed during rounds, % (95% CI)	31 (29-34)	40 (37-43)	1.46 (1.22-1.73)	<0.001
Orders placed during rounds, % (95% CI)	33 (32-34)	36 (34-37)	1.11 (1.03-1.21)	=0.01
D/C summaries w/in 24 hrs from order, % (95% CI)	79 (75-83)	94 (90-96)	3.82 (2.21-7.05)	<0.001

PROBABILITY AND CONFIDENCE INTERVALS ARE ADJUSTED FOR CENSUS AND BACK-TRANSFORMED FROM THE LOGIT SCALE. P-VALUES ARE BASED ON LOGISTIC REGRESSION ANALYSIS.

CONCLUSIONS AND NEXT STEPS

- Providing individual laptops to residents for rounding was associated with:
 - Higher % of progress notes and orders signed during rounds
 - D/c summaries signed earlier
 - Trend towards more time with patients and on education
 - High satisfaction in laptop group
 - Added benefit → paperless, environmental impact
- Limitations
- Next steps:
 - Expand to all IM teams, other departments, APC teams
 - Use for H&Ps
 - Analyze duty hour data, historical comparison

REFERENCES:

- 1) Mamykina, L, et al. How Do Residents Spend Their Shift Time? A Time and Motion Study With a Particular Focus on the Use of Computers. *Acad Med*. 2016;91:827–832.
- 2) Block et al. In the Wake of the 2003 and 2011 Duty Hours Regulations, How Do Internal Medicine Interns Spend Their Time? *J Gen Intern Med* 2013; 28(8): 1042-7
- 3) Destino, et al. Inpatient hospital Factors and Resident Time with Patients and Families. *Pediatrics*. 2017;139(5):e20163011
- 4) Wenger et al. Allocation of Internal Medicine Resident Time in a Swiss Hospital: A Time and Motion Study of Day and Evening Shifts. *Annals of Internal Medicine*. 2017;166:579-586.
- 5) Fletcher, K, et al. The Composition of Intern Work While on Call. *J Gen Intern Med*, 2012. 27(11):1432–7.
- 6) Leafloor, et al. Time is of the essence: an observational time-motion study of internal medicine residents while they are on duty. *Canadian Medical Education Journal*. 2017, 8(3)
- 7) Death By 1,000 Clicks: Where Electronic Health Records Went Wrong. <https://khn.org/news/death-by-a-thousand-clicks/>



THANK YOU!

casey.gradick@hsc.utah.edu



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