



Quality and Safety Scholarship- Beginning of My Journey

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Disclosures

- ▶ Funded from Agency for Health Research and Quality (AHRQ)

Vice Chair for Quality and Patient Safety

- ▶ New position within the DOM
- ▶ Focus is to help develop quality and safety projects for faculty and trainees
 - ▶ Support for data collection, study design and mentorship
- ▶ Goals are to make this an academic focus
 - ▶ Grants and Papers
- ▶ Work with and modify the existing infrastructure for Quality and Safety research

Quality Improvement

- ▶ Is a systematic, formal approach to the analysis of practice performance and efforts to improve performance. A variety of approaches—or QI models—exist to help you collect and analyze data and test change.
- ▶ Quality can be assessed ACROSS the Triple Aim
 - ▶ Patient related
 - ▶ Provider Related
 - ▶ System Relate
- ▶ How to I study how my system is performing

Models For QI

- ▶ Lean (OPEX)- A strategy and theory which focuses on minimizing waste. Derived from Toyota
 - ▶ Very process focused
 - ▶ OPEX is an OHSU adoption of LEAN
- ▶ 6 Sigma- Different process. Main focus is to reduce Variance
- ▶ PDSA cycles

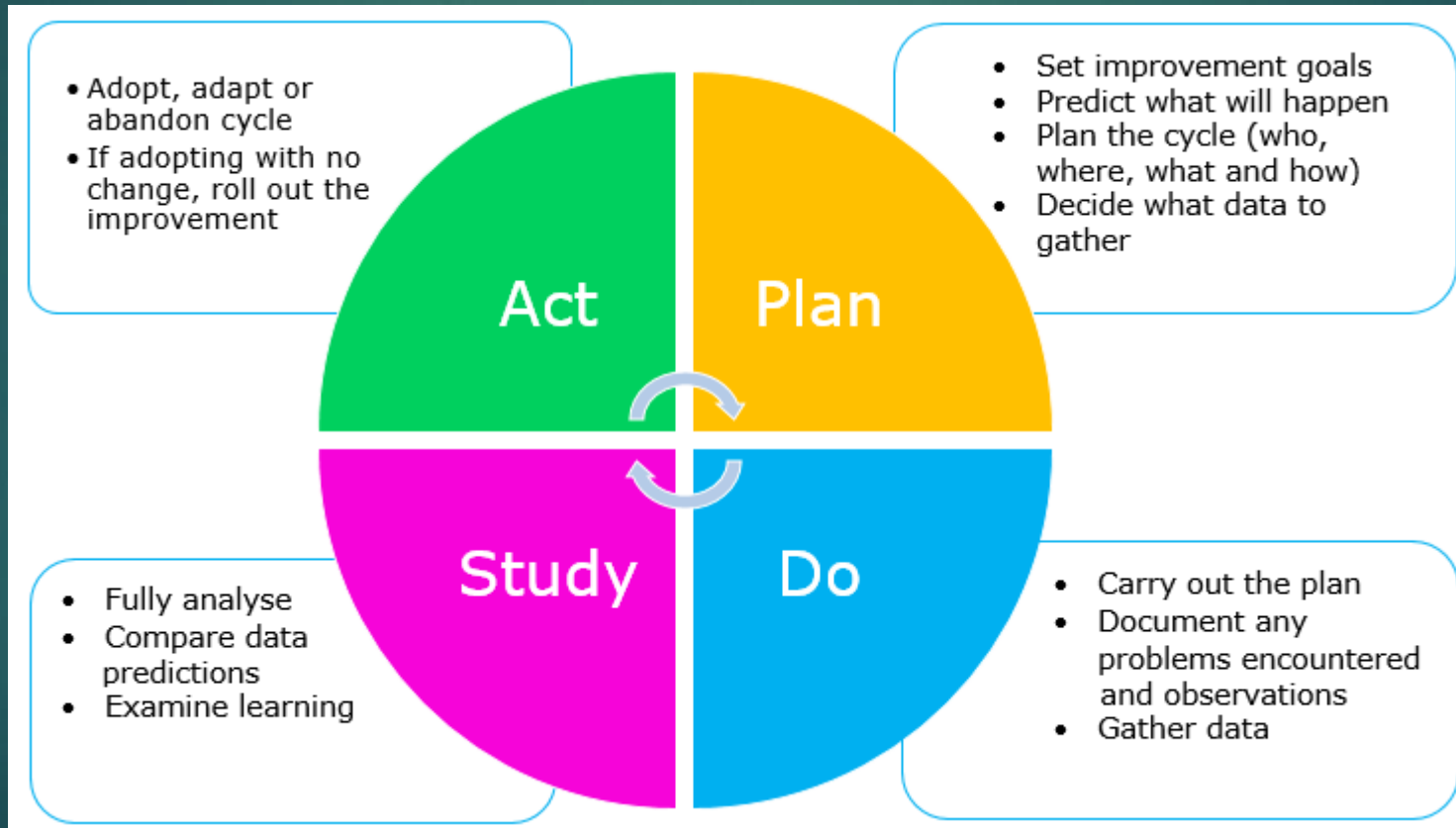
6 Sigma

- ▶ Designed to Reduce Variance



PDSA Cycle (Plan Do Study Act)

- ▶ Core methodology for Rapid Cycle Improvement



Implementation Science

- ▶ Is the **scientific** study of methods and strategies that facilitate the uptake of evidence-based practice and research into regular use by practitioners and policymakers
- ▶ I have my QI/PS idea, how do I make sure that people adopt it?
- ▶ QI works for a unit, Implementation science disseminates it somewhere new

Patient Safety

- ▶ Outcomes which work directly on improving patient safety and reducing medical error
 - ▶ Considered one endpoint of Quality
- ▶ Should overlap with quality, but not always (depends on priorities)
 - ▶ OHSU segregates Safety and Quality
- ▶ Will interface with Cost analysis
- ▶ Starts with Outcome Assessment vs. Process Assessment

What To Work On?



You can't choose

Your parents

Risk Matrix

High Frequency Low Severity	Low Frequency Low Severity
High Frequency High Severity	Low Frequency High Severity

Frequency

High Frequency

- ▶ Daily CBC Ordering
- ▶ Inappropriate CTA ordering
- ▶ Poor Donning and Doffing on PPE
- ▶ Failure to convert IV to Oral Opioids

Low Frequency

- ▶ Missed DX of Pulmonary Veno-occlusive Disease
- ▶ Failure of empiric treatment of VISA
- ▶ Room temperature in cryoglobulin patients

Severity-In the Eye of the Beholder

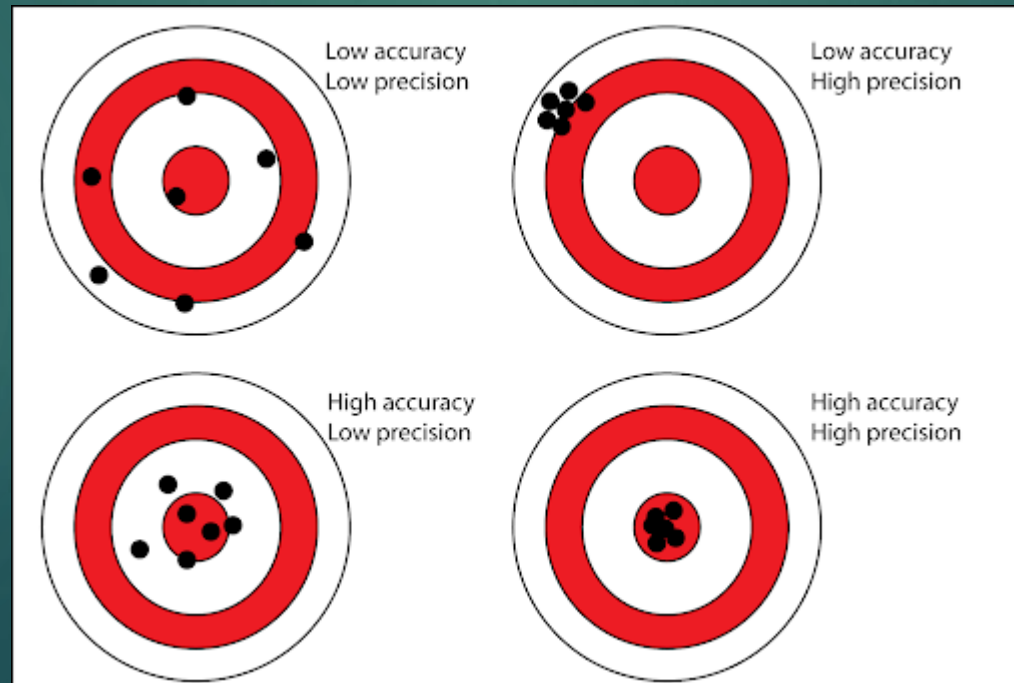
- ▶ Much more complicated to define
- ▶ Example - C.Difficile
 - ▶ 2015 policy to limit C.Diff testing to reduce false positives (OHSU ranked in bottom 25th tile nationally)
 - ▶ System severity-High, impacts meaningful use
 - ▶ Patient severity-Low (few days of metronidazole)
- ▶ Solution-Limit C.Diff testing. Prevent samples in those on stool softeners
 - ▶ System severity-Low
 - ▶ Patient Severity-High (missed diagnosis)

Success Matrix- Can I Do it?

Collectable Data Easy Solution	No Data Easy Solution
Collectable Data Difficult Solution	No Data Difficult Solution

Data Collection- Precision vs Accuracy

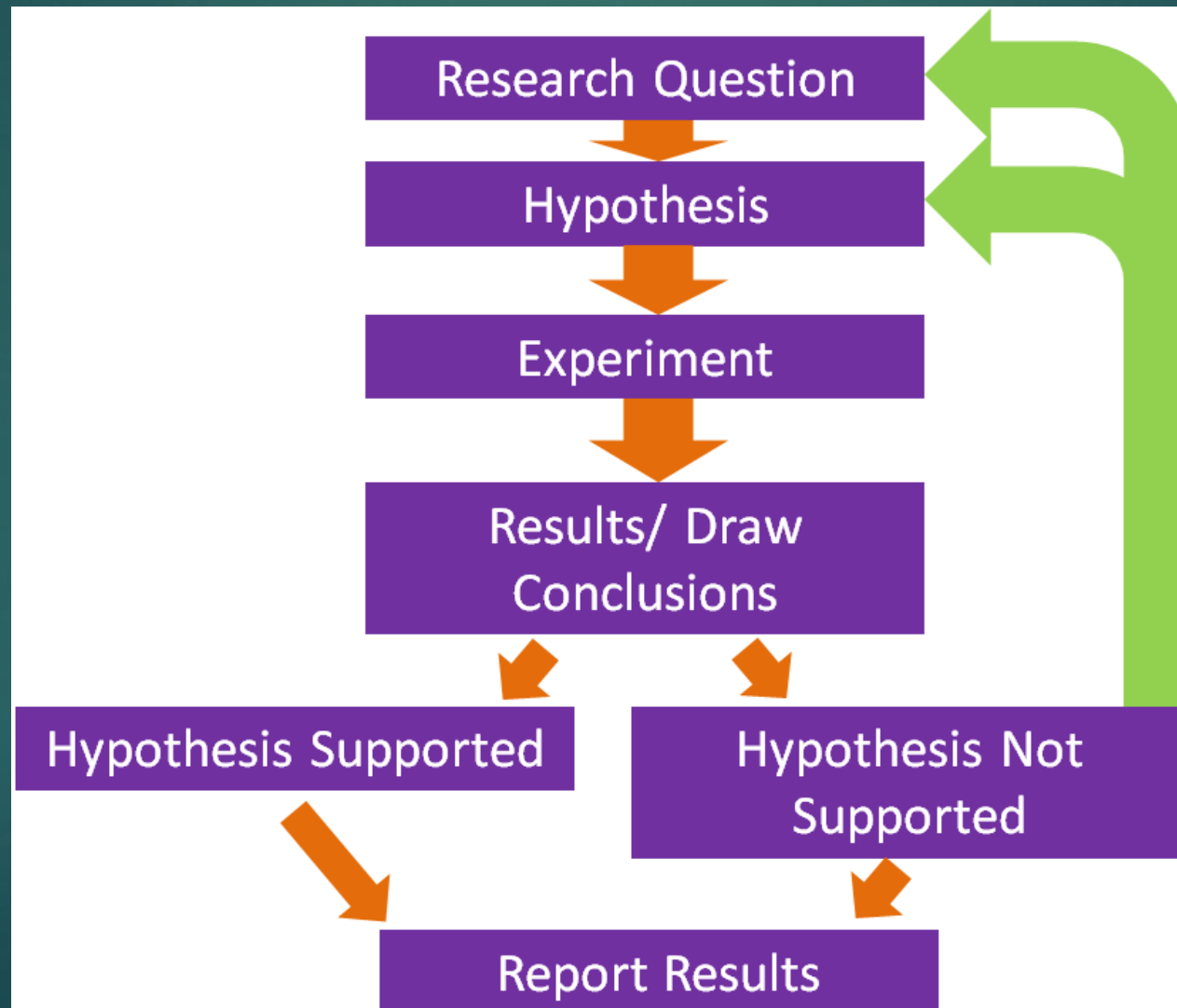
- ▶ If you cant measure it, you cant fix it
- ▶ Measurement has to be easy and reproducible.
Precision vs. Accuracy



Data Collection- Source and Scale

- ▶ What is the N of data points needed?
 - ▶ Depends on frequency of event and outcome
- ▶ How will data be collected? Manual, Administrative
- ▶ Manual Data- Can you do purposeful sampling, if so when and how and what frequency?
- ▶ Administrative Data
 - ▶ What is source? (EPIC, PSI, Qview)
 - ▶ Can you analyze it in its format?
 - ▶ Cost?

How to Turn Quality and Safety into Scholarship?-Its Science



How to Turn Quality and Safety into Scholarship?

- ▶ **Its all about asking the right question**
- ▶ Ideally the answer is relevant no matter what it is
- ▶ Don't focus on un-validated surrogates UNLESS you cant assess actual outcomes
- ▶ Find a mentor
- ▶ Use your risk and success matrix to define the question
- ▶ Work as a team. You cant do this alone

Where in the Quality/Safety Spectrum Are You?

New Problem

Chart Review, Case Series, Observation, Survey

Assessment Method

Transition from Manual to automated collection

Contributing Factors

Human Factors, Simulation, Time Motion

Design/Test Intervention

Simulation, Clinical Trials

Disseminate Intervention

Multicenter Trials,

I have an Idea, What Next?

- ▶ You may not know until you get your baseline data
- ▶ Start small
- ▶ Make sure you can measure your endpoint
 - ▶ Is your endpoint a surrogate, if so, is it validated
- ▶ Do you have institutional buy in (Nursing, RT Pharmacy)
- ▶ What is your time frame?

Where To Start- Needs Assessment

- ▶ National Standards/Reporting (UHC)
 - ▶ Meaningful Use (eg COPD readmission rate)
 - ▶ HCAI/Never Events
- ▶ Institutional Tier 1 Priorities
 - ▶ National vs Local need
 - ▶ PSI database, Med Mal, UHC data, Financial
- ▶ Divisional/Departmental-What do WE feel needs to be done
 - ▶ Fits the Academic Triple Aim (Education vs. Clinical vs. Scholarship)

Where To Start- Needs Assessment- Departmental Survey

For **INPATIENTS** you manage/consult on, how significant were each of these issues towards patient Quality and Safety **Pre-COVID-19?**

	Not Significant		Moderately Significant		Very Significant
Delayed/Missed Diganosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medication Errors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patient Access to Care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Procedural Complications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inappropriate Resource Utilization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Example #1 - Errors of Communications in ICU Rounds

- ▶ Significant errors in communication exist on ICU rounds. These errors are driven by sociotechnical factors, not the inherent nature of the data

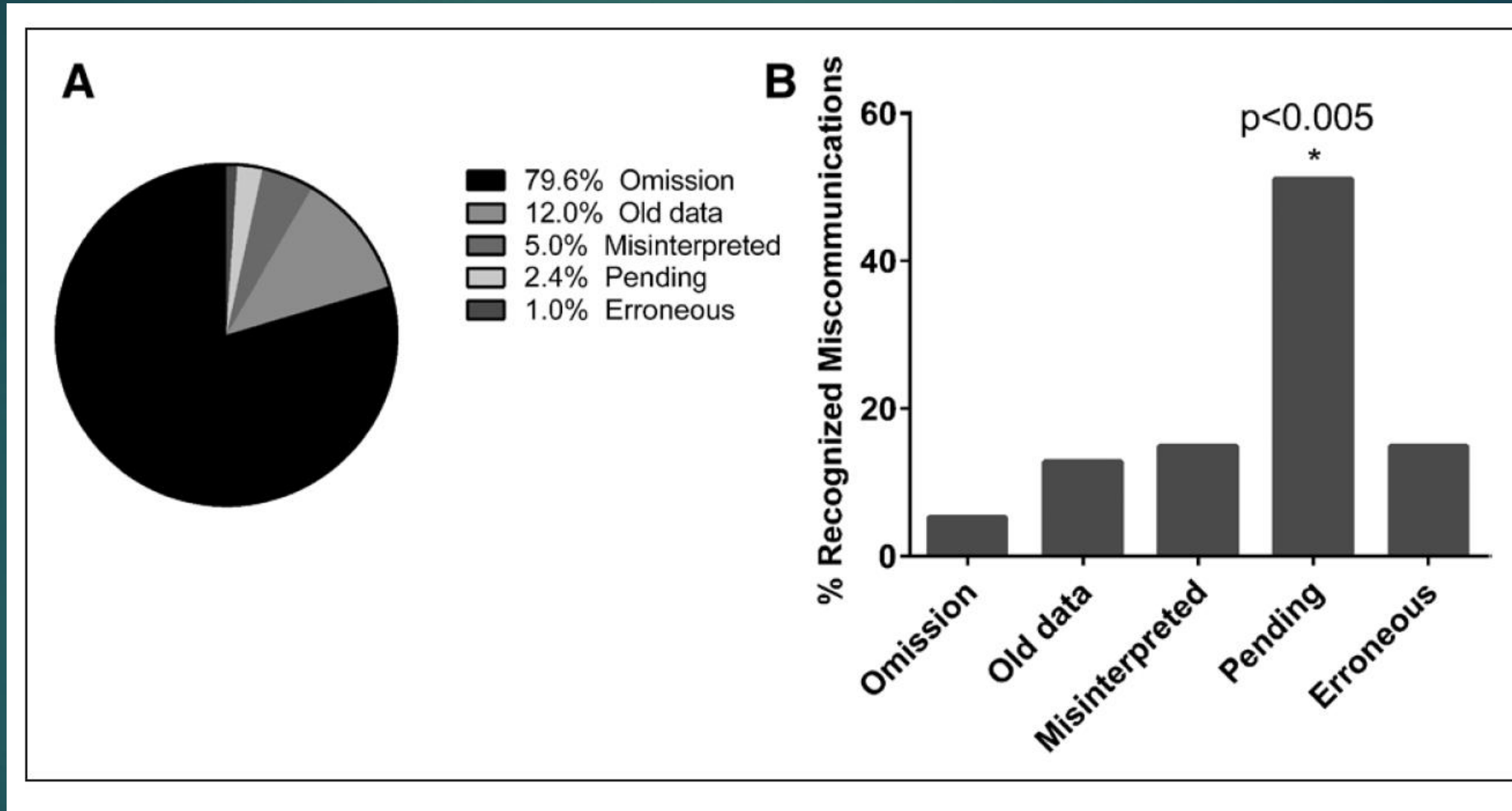
Data Quality is NOT Verbal Quality

	Accurate	Not Accurate
Good Quality/Entertaining	 The poster for the movie 'Argo' features a close-up of Ben Affleck's face. Text on the poster includes 'BEN AFFLECK · BRYAN CRANSTON · ALAN ARKIN · JOHN GOODMAN', 'ARGO', and 'THE MOVIE WAS FAKE. THE MISSION WAS REAL.' The release date '10.12.12' is also visible.	 The poster for 'Forrest Gump' shows Forrest Gump sitting on a bench, looking towards the right. The title 'Forrest Gump' is written in a large, blue, serif font at the top.
Bad Quality/Boring	 The poster for 'Lincoln' features a profile view of Daniel Day-Lewis as Abraham Lincoln. The title 'LINCOLN' is prominently displayed in the center.	 The poster for 'Pearl Harbor' shows a biplane flying over a ship at sea, with three main characters' faces superimposed on the sky. The title 'PEARL HARBOR' is at the bottom.

ICU Rounding Audits-Common Labs

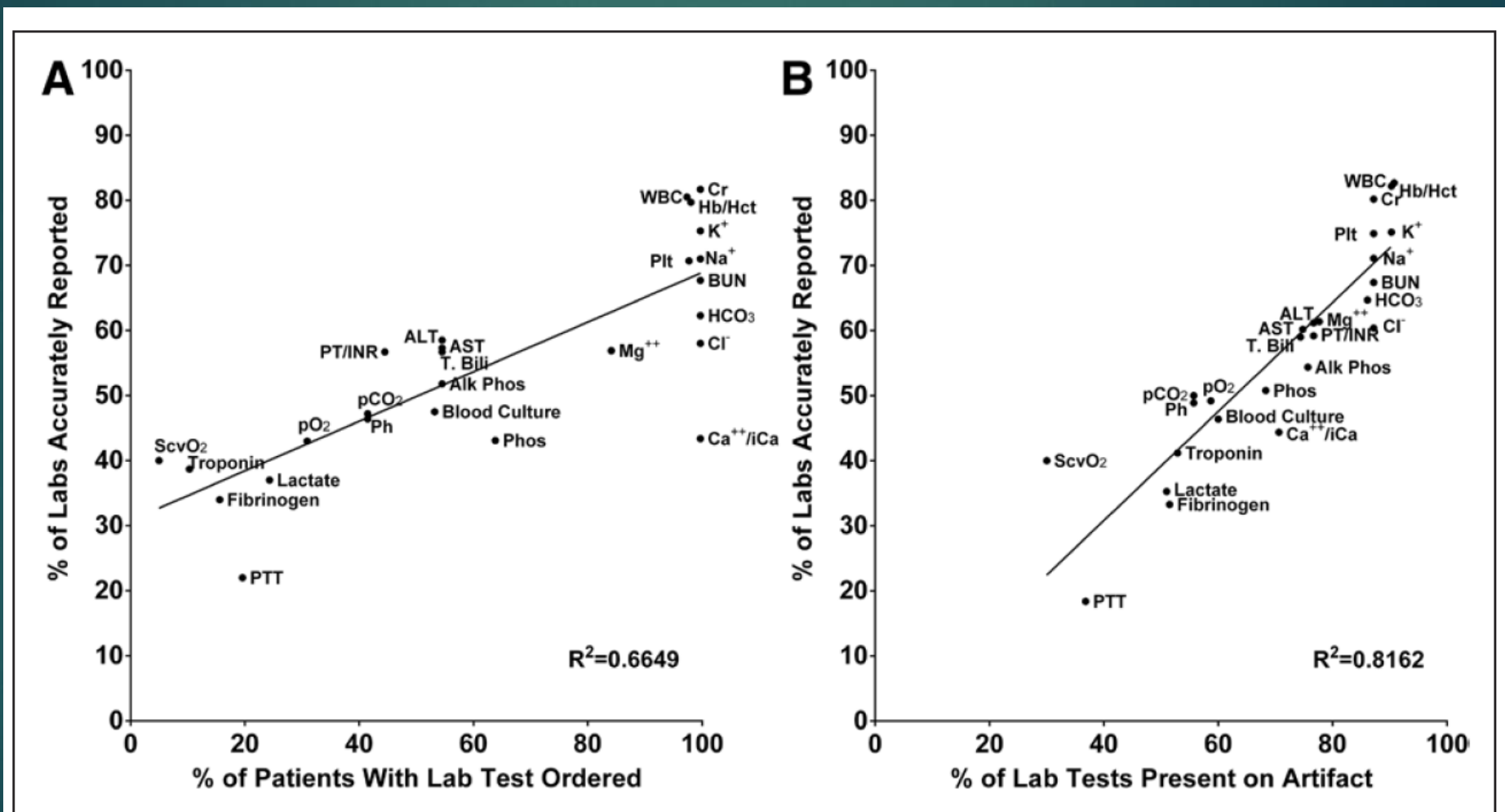
- ▶ Decided on 20 common labs tests frequently ordered in ICU
- ▶ Study team members would print out lab results immediately prior to presentation
- ▶ Study team would mark whether the most recent data was presented, if so by whom, and if so, if correct
- ▶ Team members were given credit for qualitative or quantitative description
- ▶ After presentation, we collected the rounding tool “artifact”, copied for analysis
 - ▶ Verbalization vs. artifact creation failure

Errors in Communication of Laboratory Values



Mean 5.6 errors/patient and 95% with at least 1 error

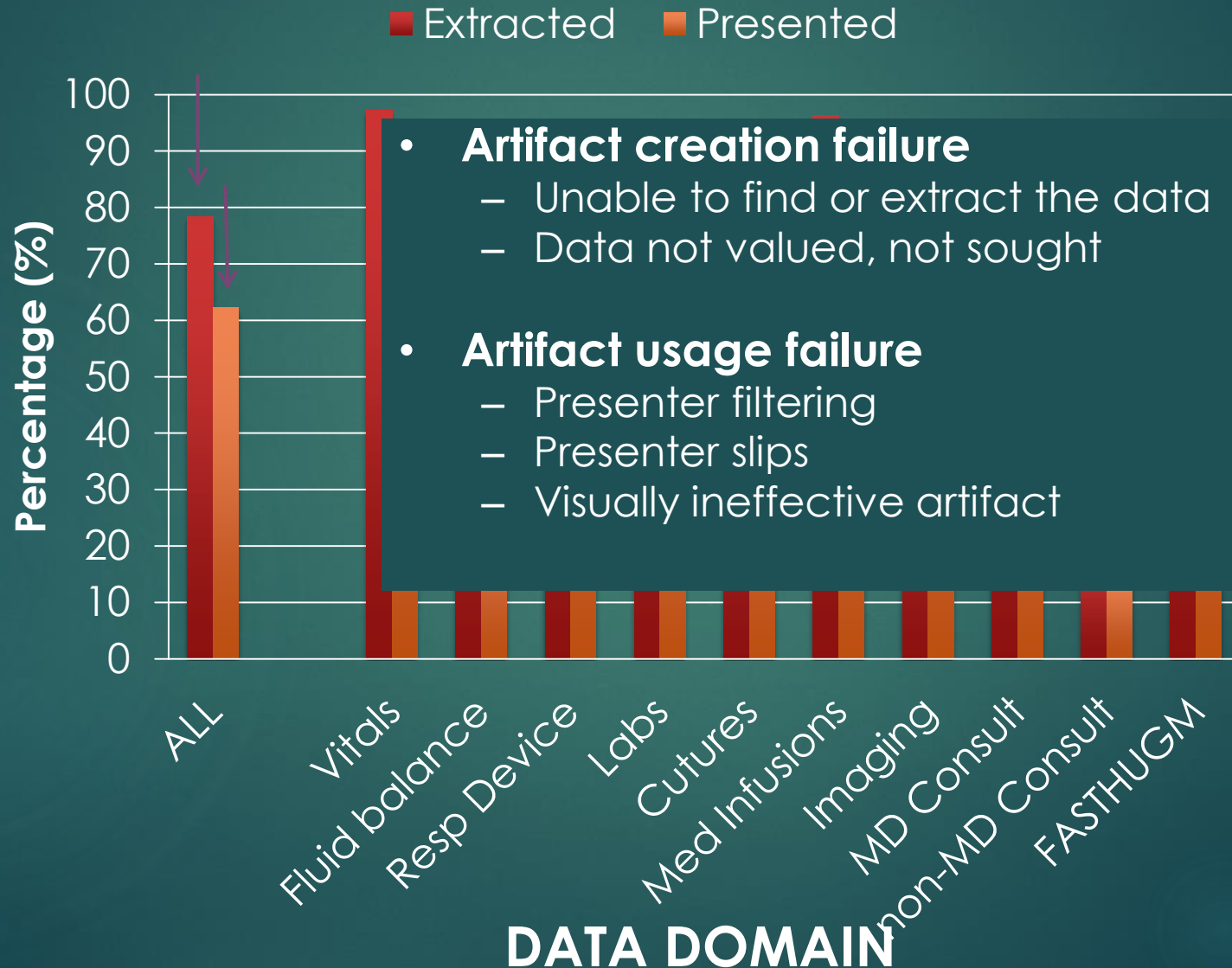
Frequency of Miscommunication Correlates with Ordering Frequency



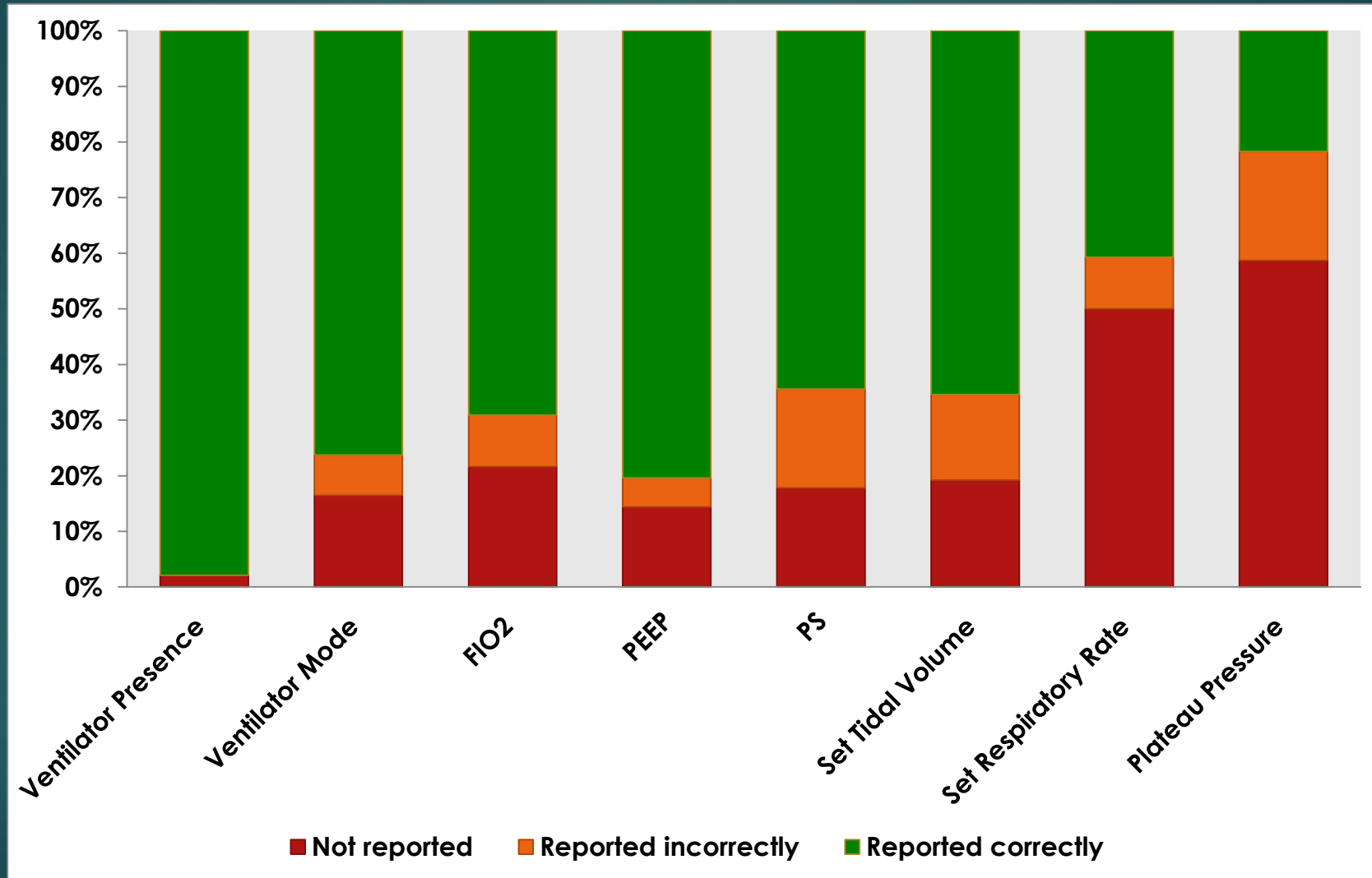
Critique-These are Just the “Common Labs”, What About Everything Else?

- ▶ Repeated Rounding audits
- ▶ All rounds were audio recorded and professionally transcribed
- ▶ Focused only on data omissions
- ▶ For continuous data, credit for mentioning the category of data (eg. BP or RR)

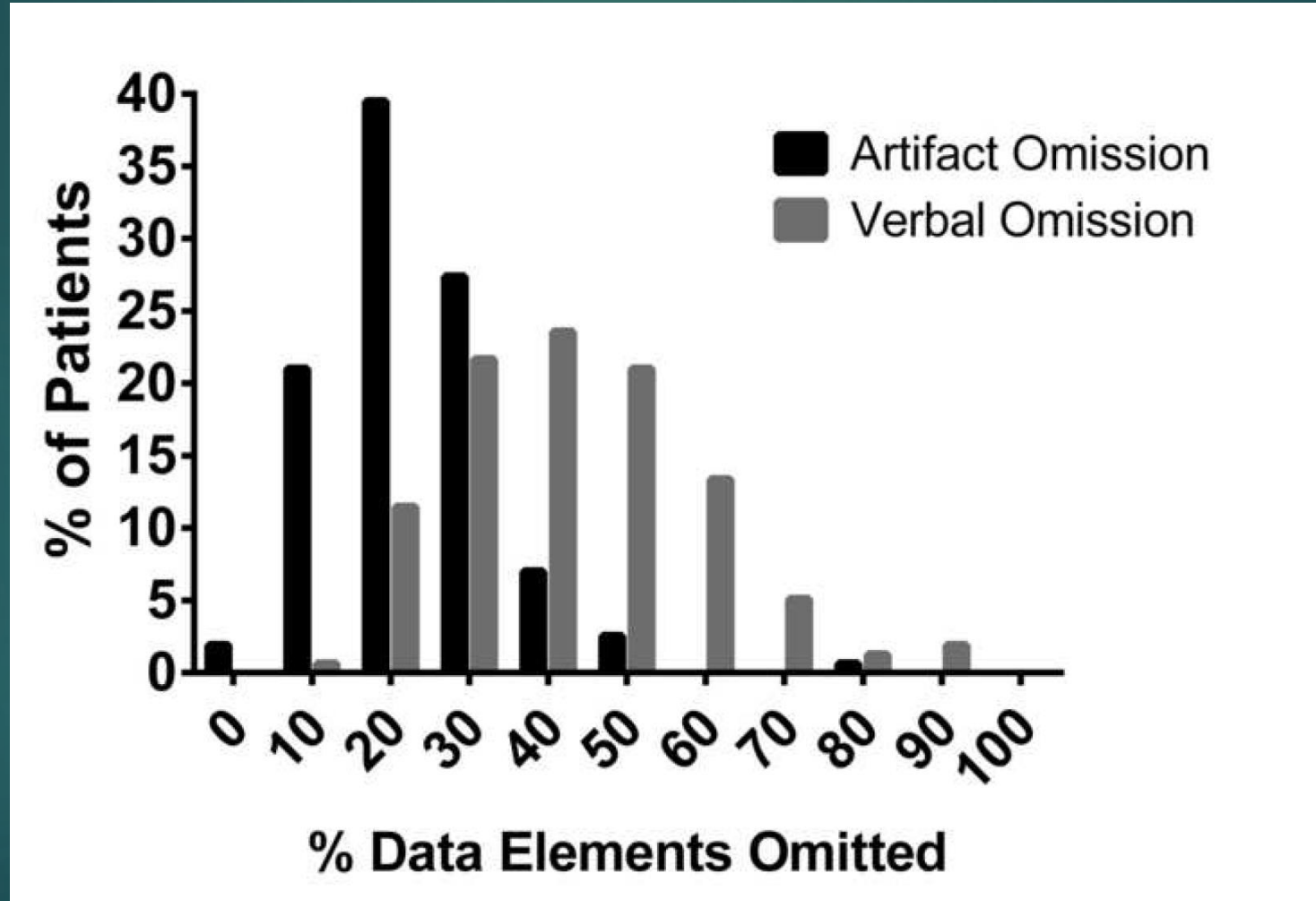
Completeness of Collation and Presentation by Data Domain



Communication Errors in Reporting Ventilator Settings



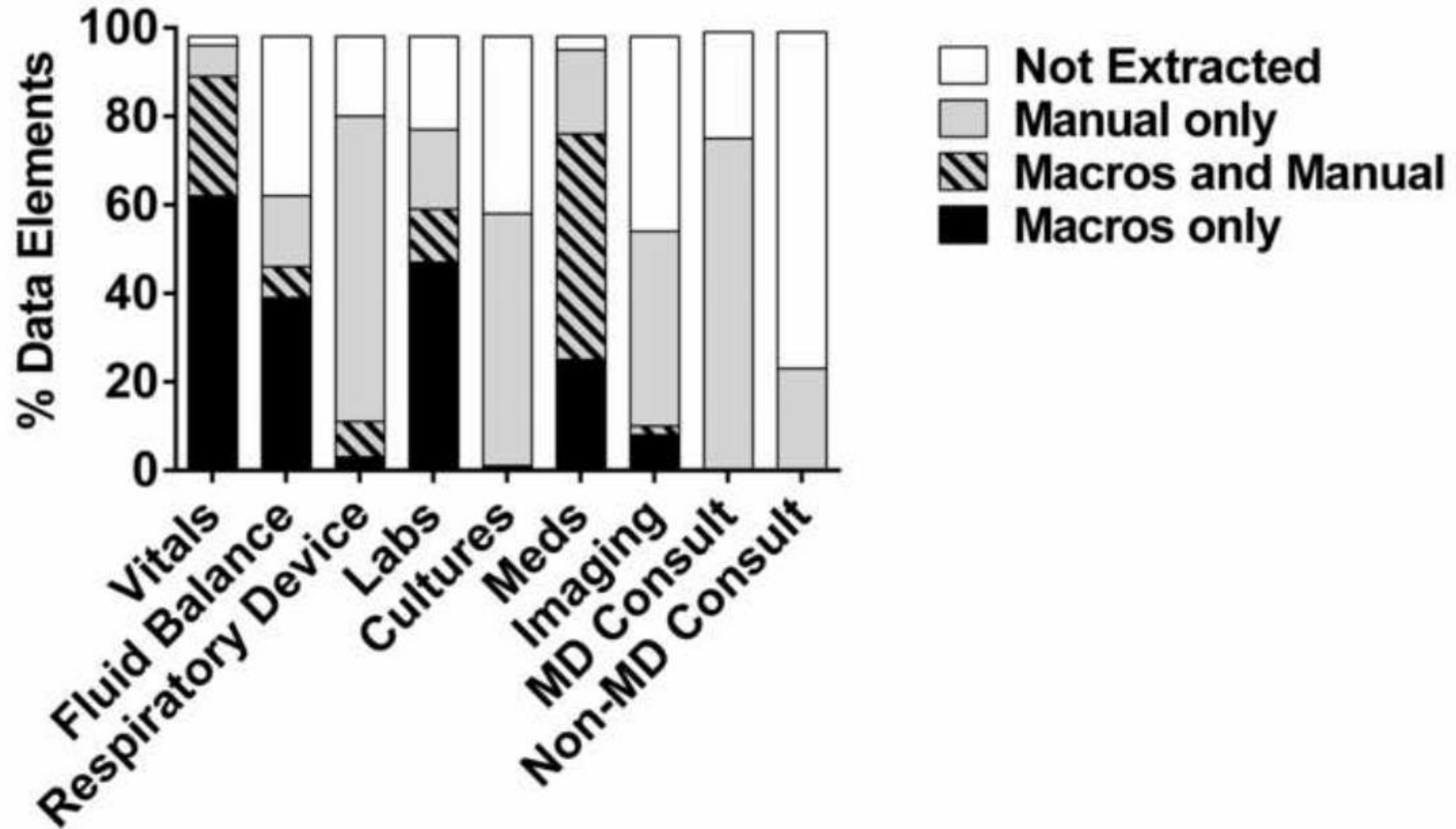
Frequency of Data Omissions in ICU Rounds



Sociotechnical Predictors of Communication Errors

Factor	Artifact Omissions		Verbal Omissions	
	n (%)	RR (95% CI)	n (%)	RR (95% CI)
Patient Characteristics				
Follow-up vs. Newly admitted	391 (22.6) 995 (23.0)	ns	728 (42.1) 1849 (42.7)	ns
Remaining in ICU vs. Ready to leave ICU	1044 (22.6) 342 (23.9)	ns	1921 (41.5) 656 (45.9)	1.11 (1.04-1.18)
Vasopressor/inotropes vs. None	272 (19.5) 1114 (23.9)	* 1.23 (1.09-1.38)	544 (38.9) 2033 (43.7)	1.12 (1.04-1.21)
Intubated vs. None	660 (22.7) 726 (23.1)	ns	1212 (41.6) 1365 (43.4)	ns
Renal replacement therapy vs. None	170 (26.6) 1216 (22.5)	ns	295 (46.1) 2282 (42.1)	ns
≥ Life-support modality vs. None	627 (23.2) 759 (22.7)	ns	1185 (43.8) 1392 (41.6)	ns
Rounding & Team Factors				
Low team census (<14 patients) vs. High (≥14 patients)	553 (23.3) 833 (22.6)	ns	1022 (43.0) 1555 (42.3)	ns
Early presentation order (1st to 7th) Vs. Late (8 th to 14th patient)	776 (22.5) 598 (23.3)	ns	1426 (41.4) 1132 (44.1)	ns
Presentation duration:				*
≤10 minutes	487 (25.2)	1.0 (ref)	943 (48.8)	1.0 (ref)
>10 to 20 minutes	718 (22.2)	0.88 (0.80-0.97)	1311 (40.5)	0.83 (0.78-0.88)
>20 minutes	181 (20.4)	0.81 (0.69-0.93)	323 (36.3)	0.74 (0.67-0.82)
Attending viewing EHR vs. Not	969 (23.0) 417 (22.6)	ns	1765 (41.9) 812 (44.0)	ns
Interrupted presentation vs. Not interrupted	137 (25.6) 1249 (22.6)	ns	212 (39.6) 2365 (42.8)	ns
Presenter Training Level		*	281 (28.0)	*
MS-4	174 (17.3)	1.0 (ref)	1249 (48.7)	1.0 (ref)
PGY-1	636 (24.8)	1.43 (1.23-1.66)	1047 (42.1)	1.74 (1.56-1.94)
PGY-2, 3	576 (23.1)	1.33 (1.15-1.56)		1.50 (1.35-1.68)
Artifact Factors				
Manually-generated only vs. Part/Entirely EHR-generated	159 (28.1) 1227 (22.3)	* 0.79 (0.69-0.91)	-	-
Data element present on artifact vs. Absent	-	-	1393 (29.9) 1171 (84.5)	* 2.83 (2.69-2.97)
Data element extracted from EHR: Manually only vs. Manually and with macros vs. with macros only	-	-	276 (18.2) 147 (18.5) 970 (41.3)	1.0 (ref) ns 2.23 (2.02-2.55)

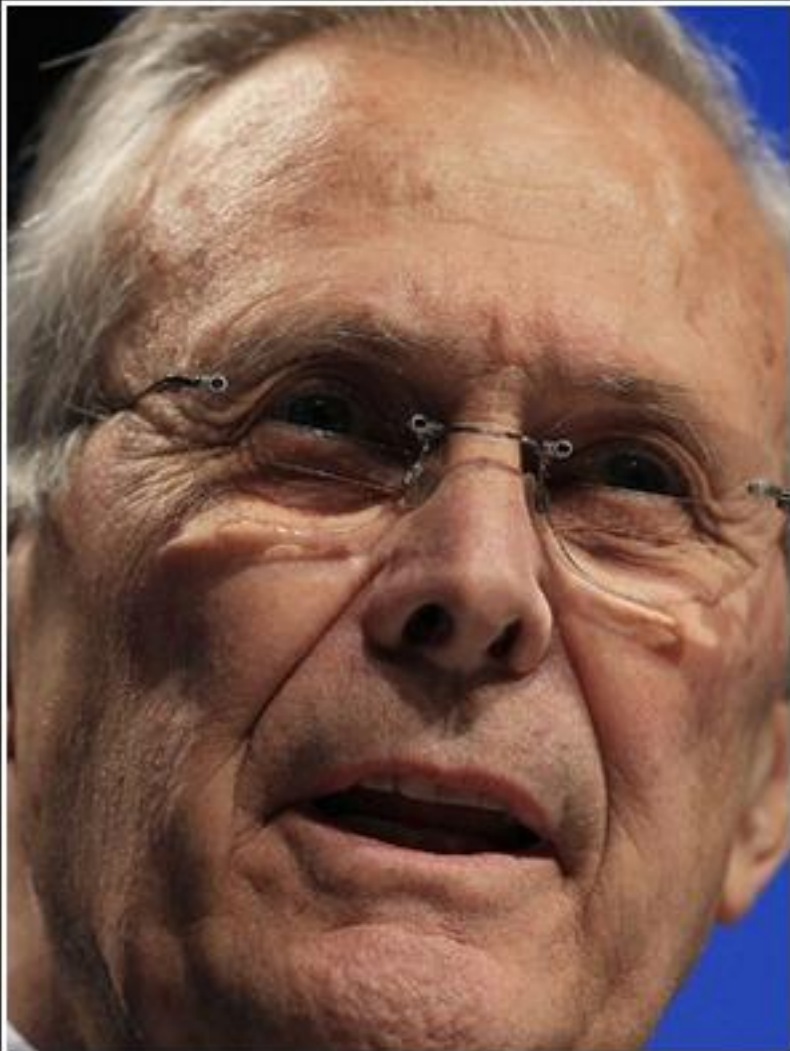
Macros vs Manual Data Extraction



Other Highlights

- ▶ 25% of consults from non-physician services were not acknowledged
 - ▶ 75% of consults from physician services were acknowledged
- ▶ 40% of pPlat>30 were not mentioned on rounds
- ▶ Almost all lab results taking more than 24hrs to return were acknowledged on rounds
- ▶ Attending use of computer had very little impact on recognition of errors

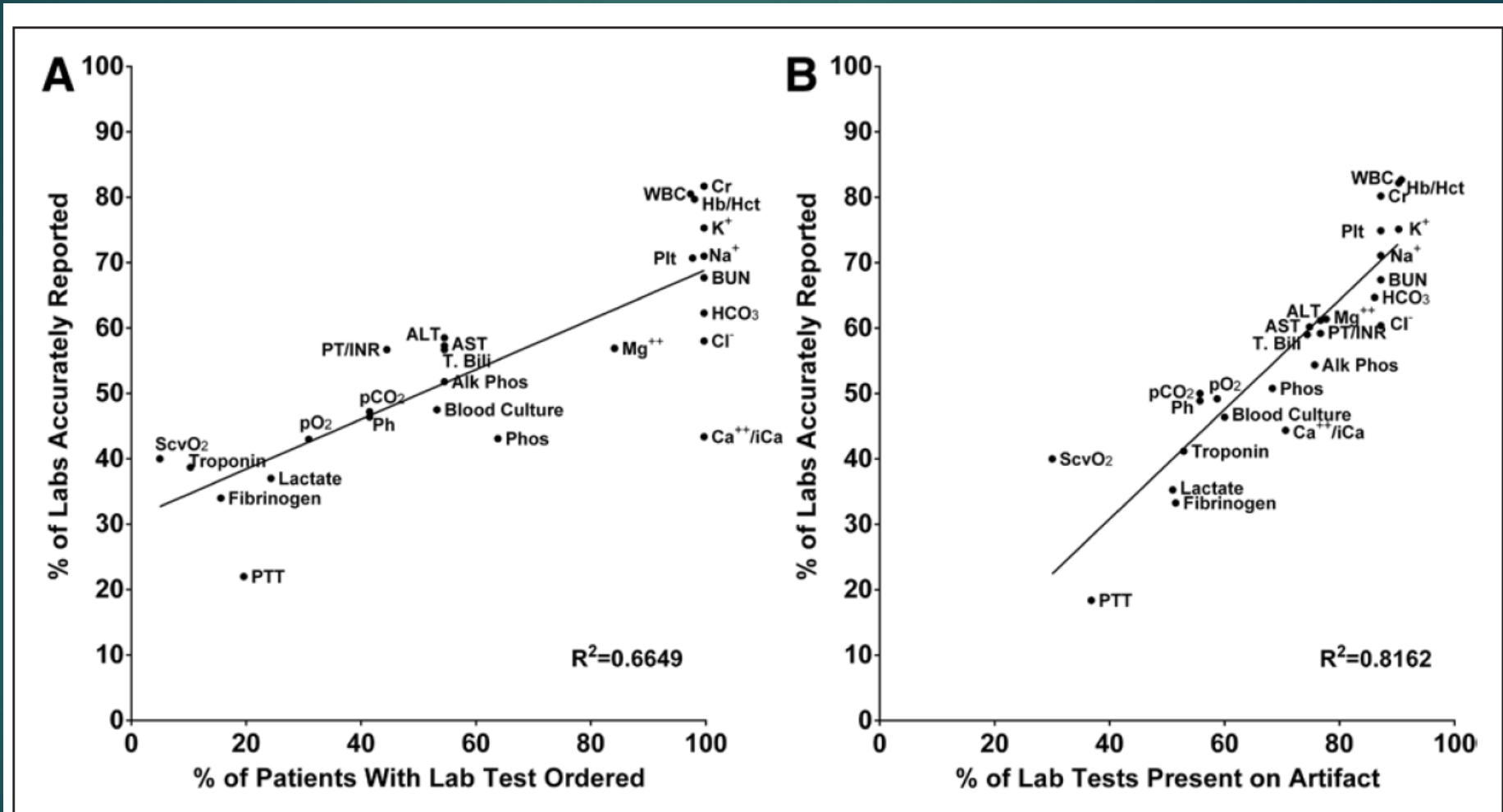
Critique #1- The Residents are Only Telling Me What is Important



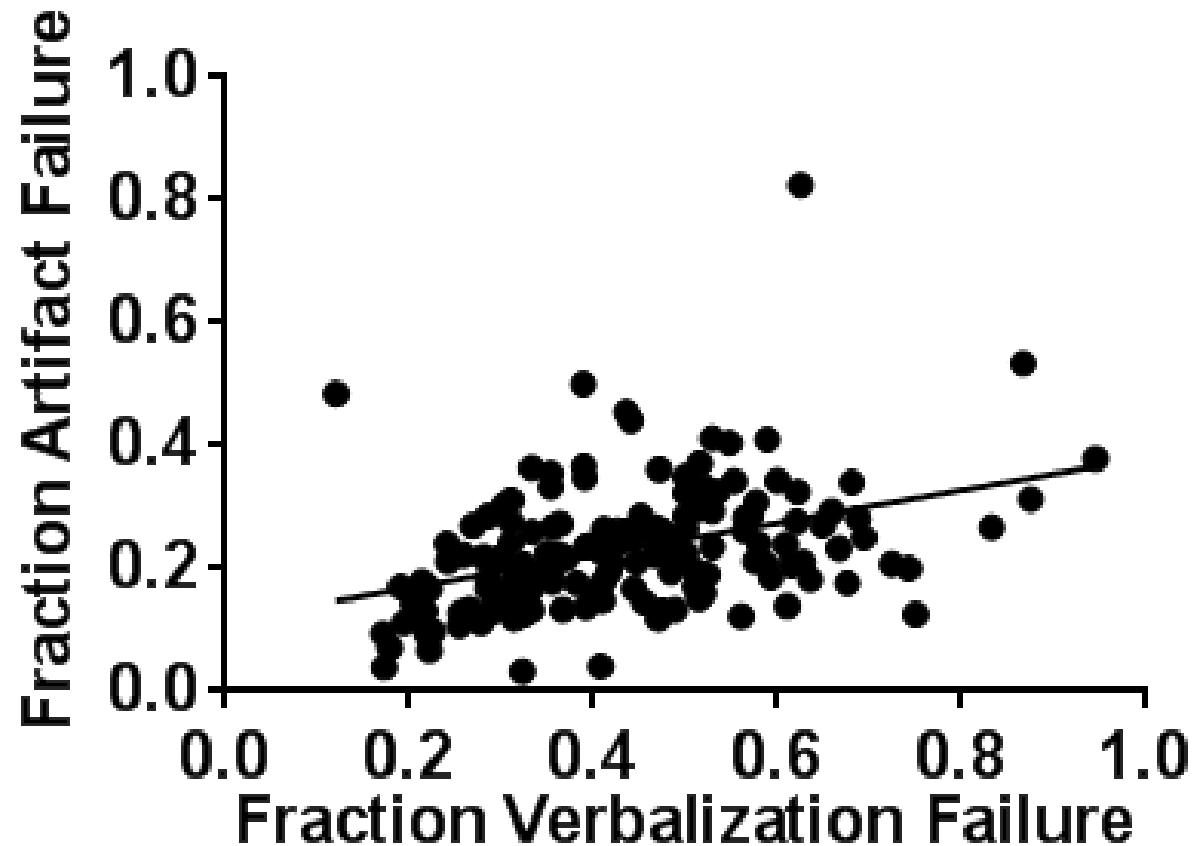
There are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns - the ones we don't know we don't know.

— *Donald Rumsfeld* —

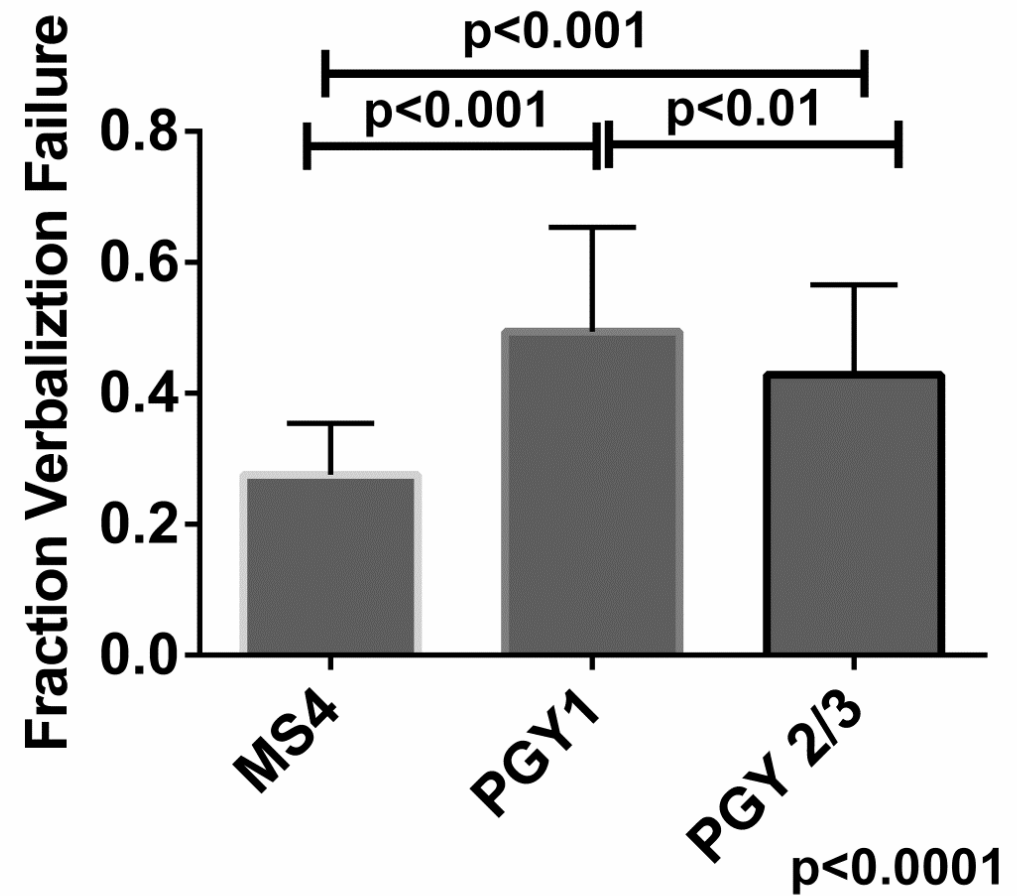
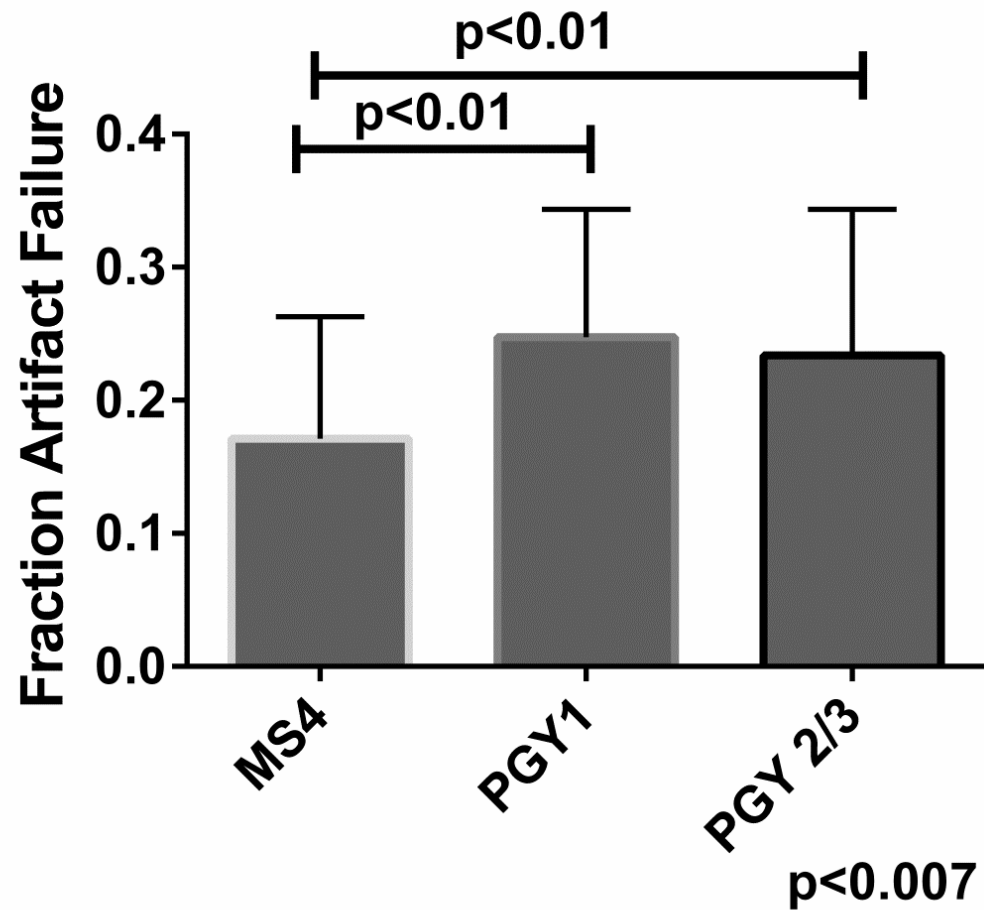
Testing Frequency Correlates With Verbalization Frequency



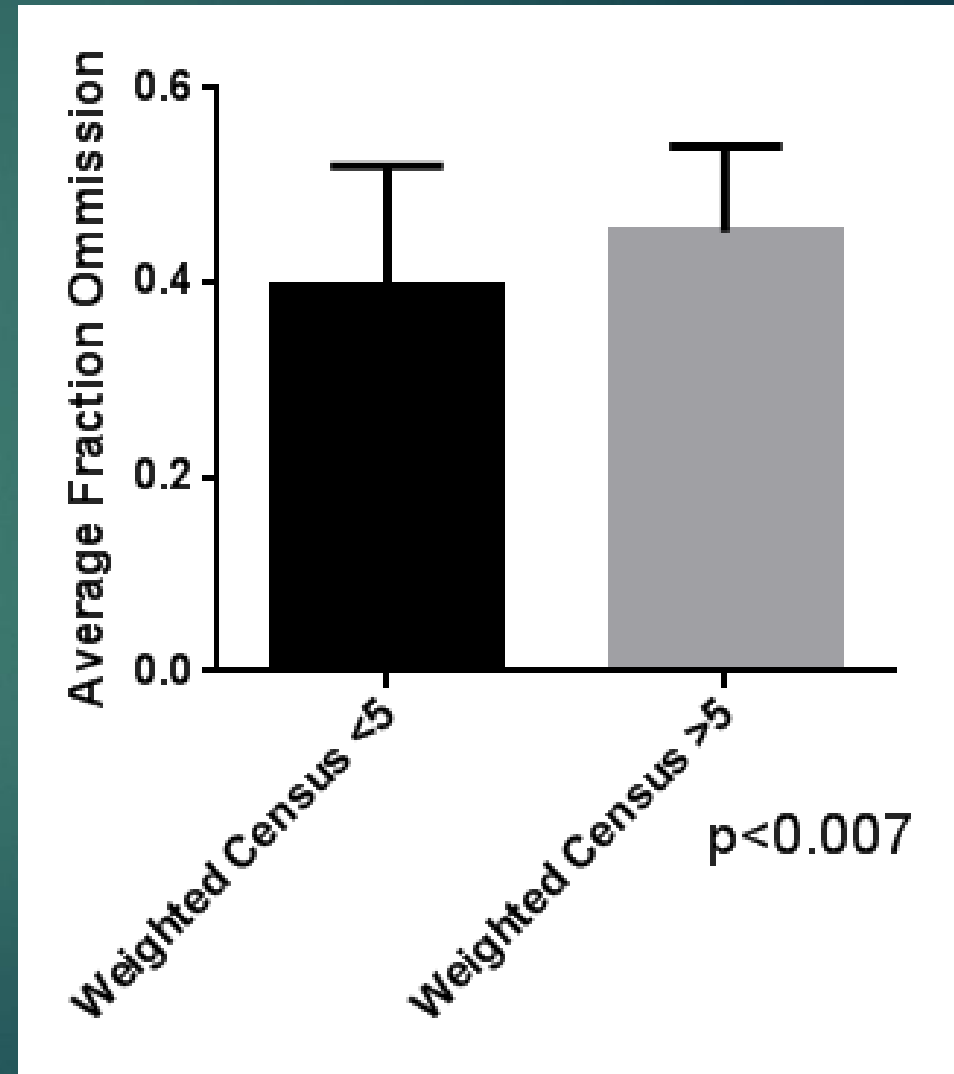
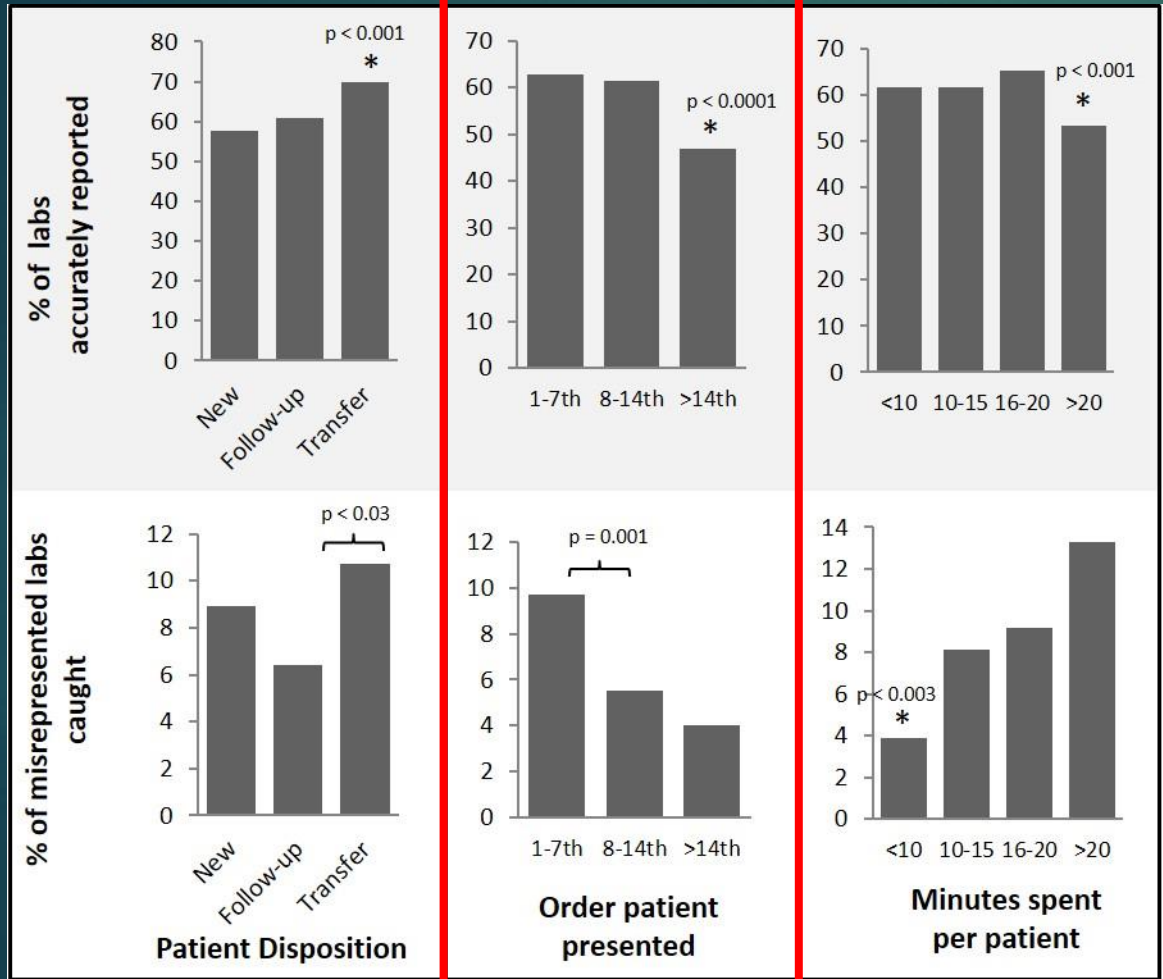
You Need to Read It to Verbalize It



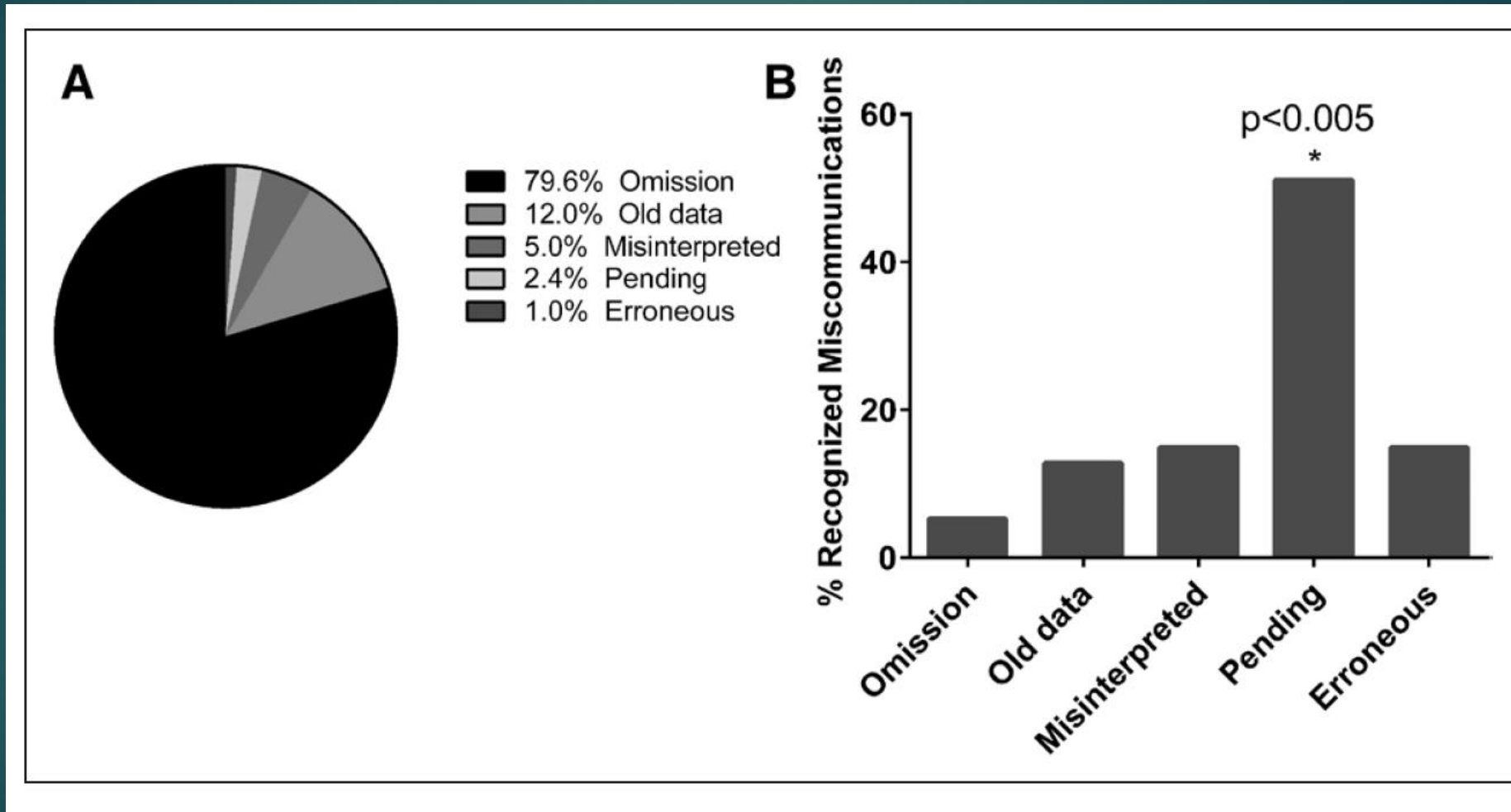
More Experienced Residents Make Fewer Errors



Its the Workload



Critique #2-We All Have Computers and Catch These in Real Time



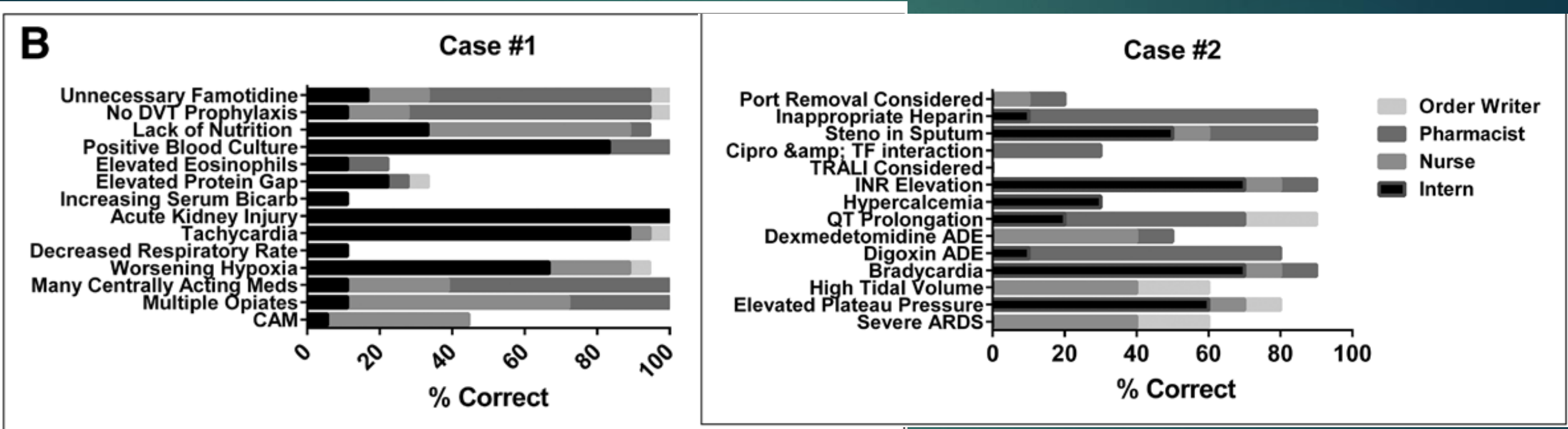
Critique #3-Are These Errors Significant?



Creation of Rounding Simulation

- ▶ Utilized EHR simulation environment
 - ▶ Copy of production, populated with purposefully designed cases
 - ▶ Cases with predefined number of patient safety issues for recognition
- ▶ RN, MD and Pharmacist given the same case to review in the EHR
 - ▶ Done sequentially and eye tracking used
- ▶ Team comes together for simulated ICU rounds
 - ▶ Fellow serves as confederate attending
- ▶ Extra resident recruited for order entry
- ▶ Reproduce entire structure of daily rounds including MD report, RN report, Pharm report, order readback
- ▶ Team scored for safety items recognized

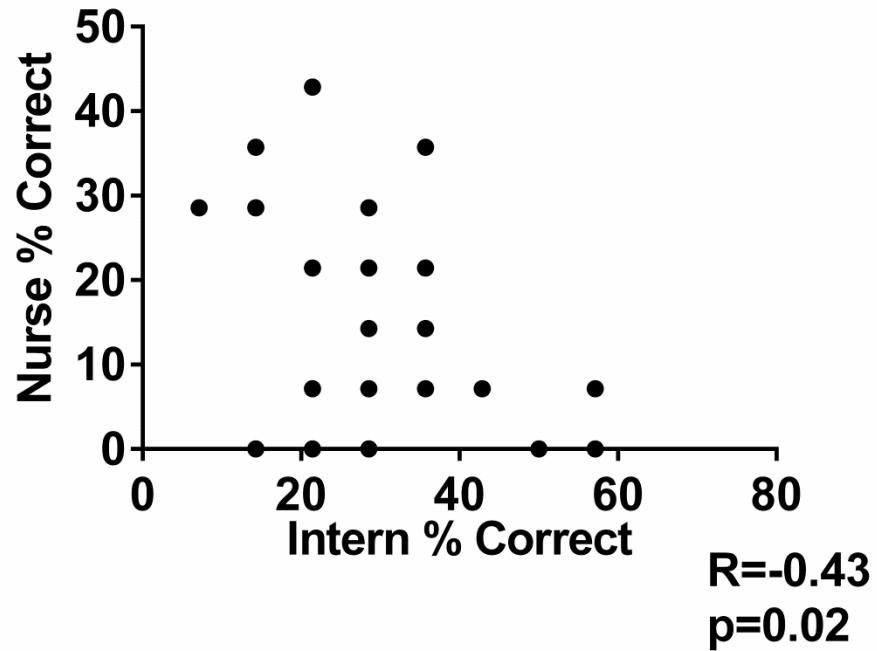
Variability in Recognition of Safety Items in Interprofessional Rounds



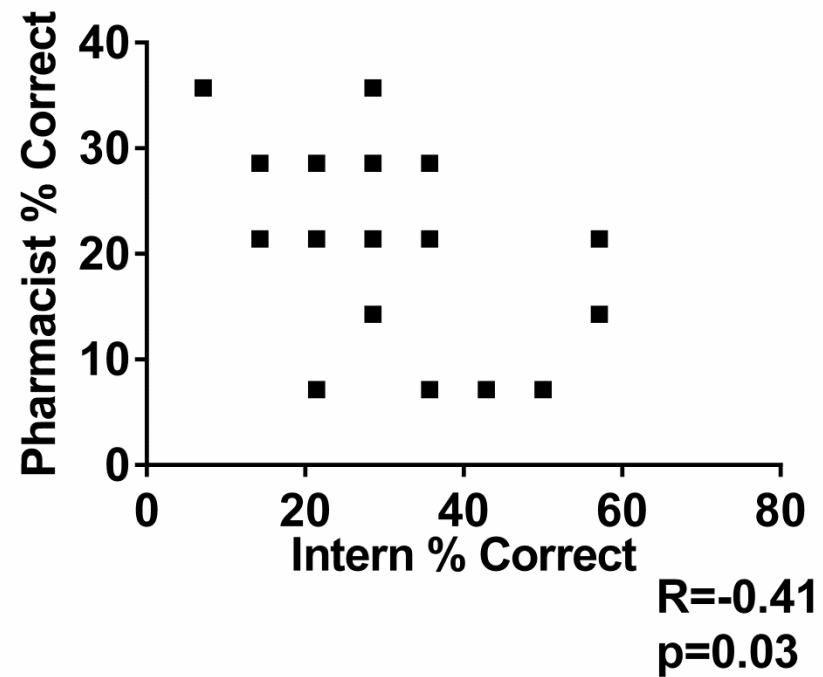
Only 44% had primary diagnosis in differential

Interprofessional Staff Act as a Safety Net For Error Recognition

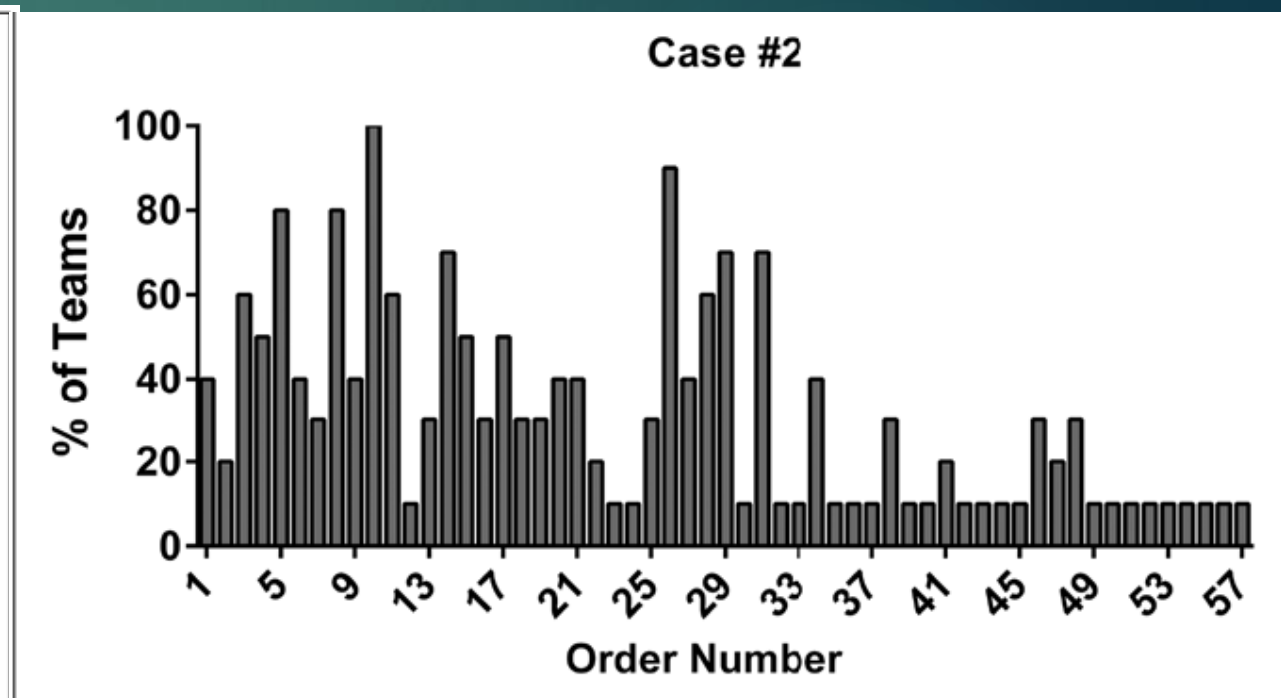
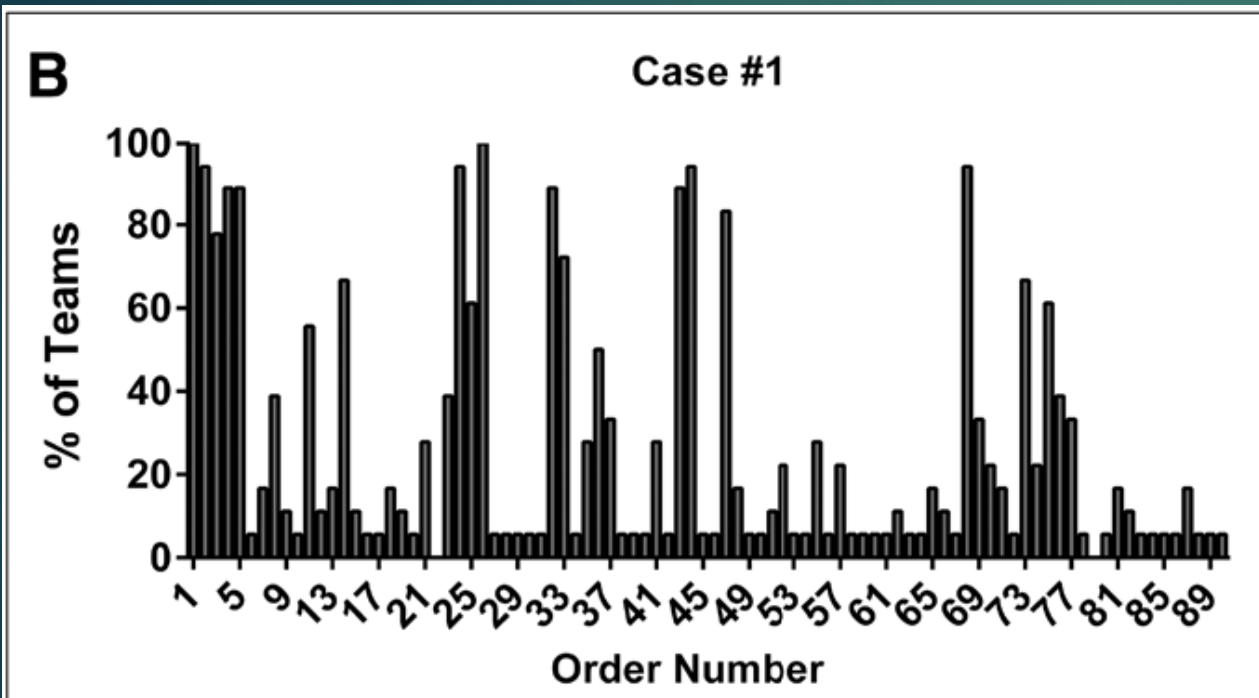
A. Nurse



B. Pharmacist



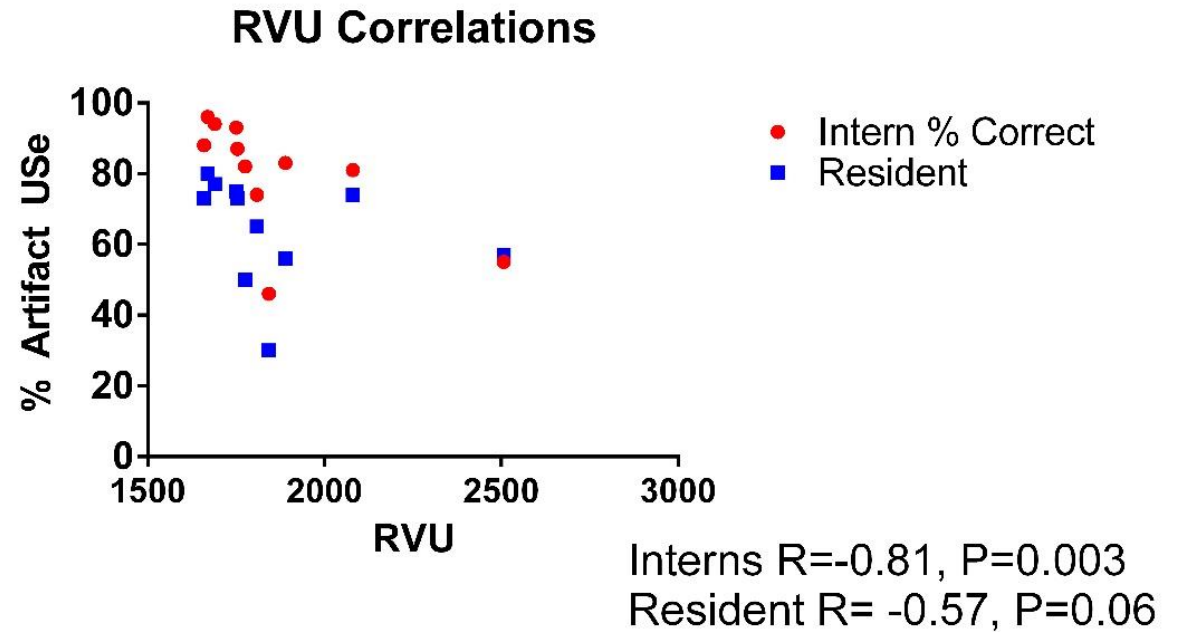
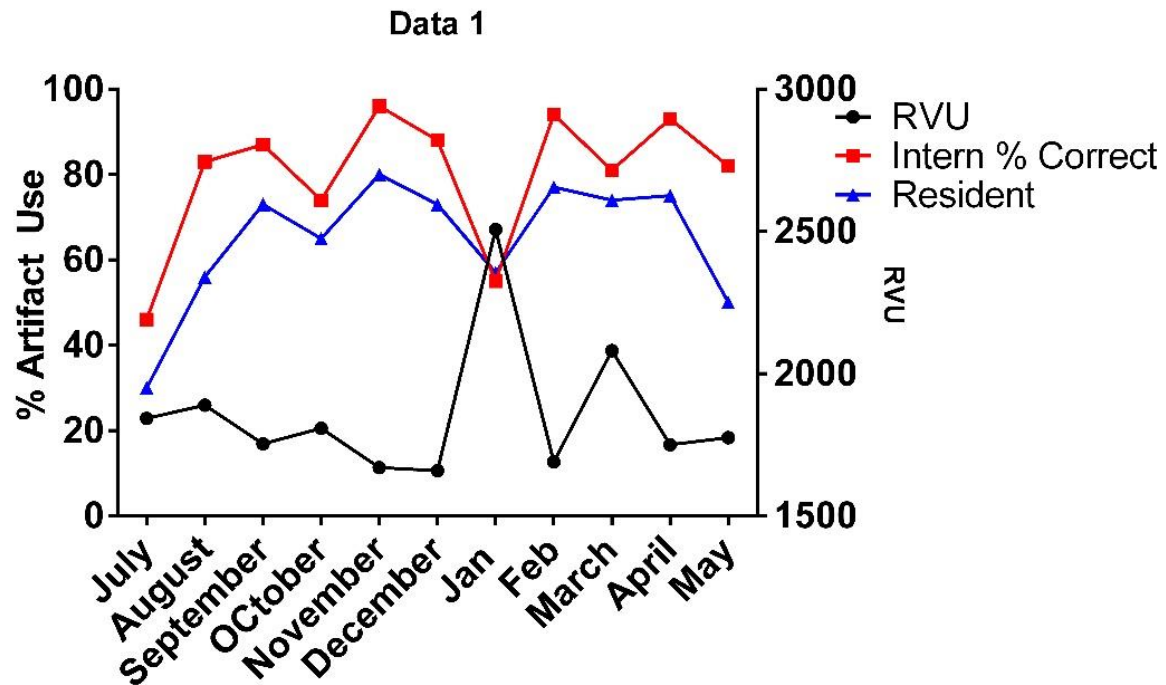
Variance in Performance Leads To Variance in Orders



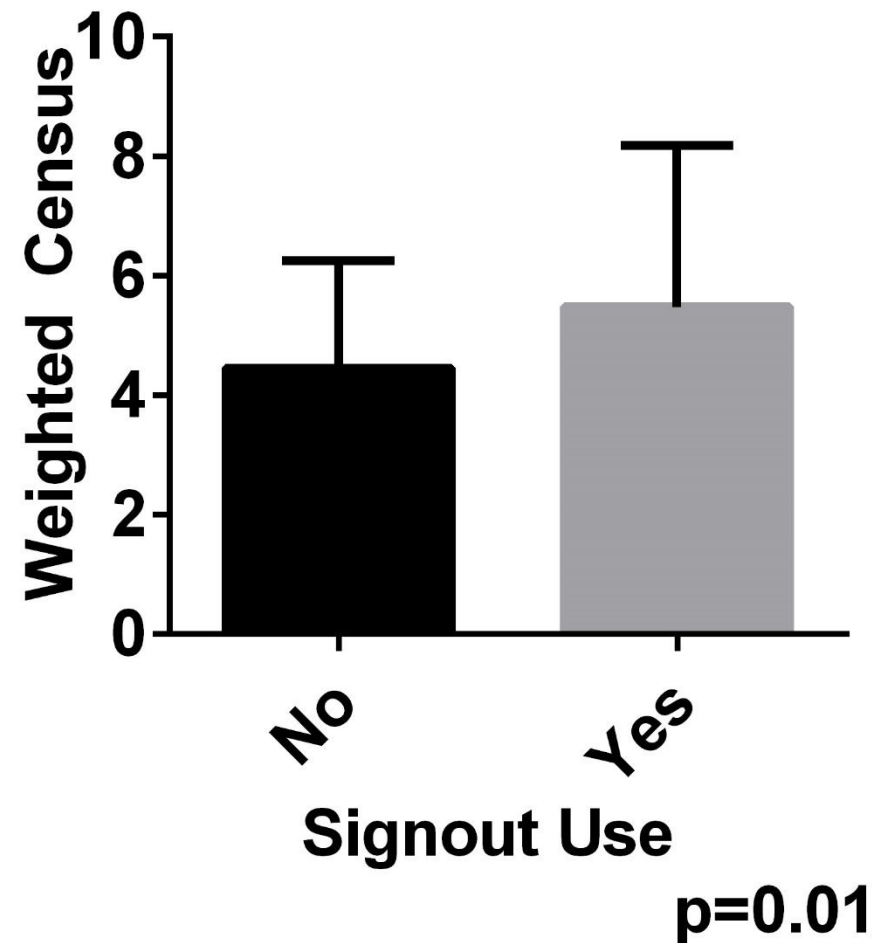
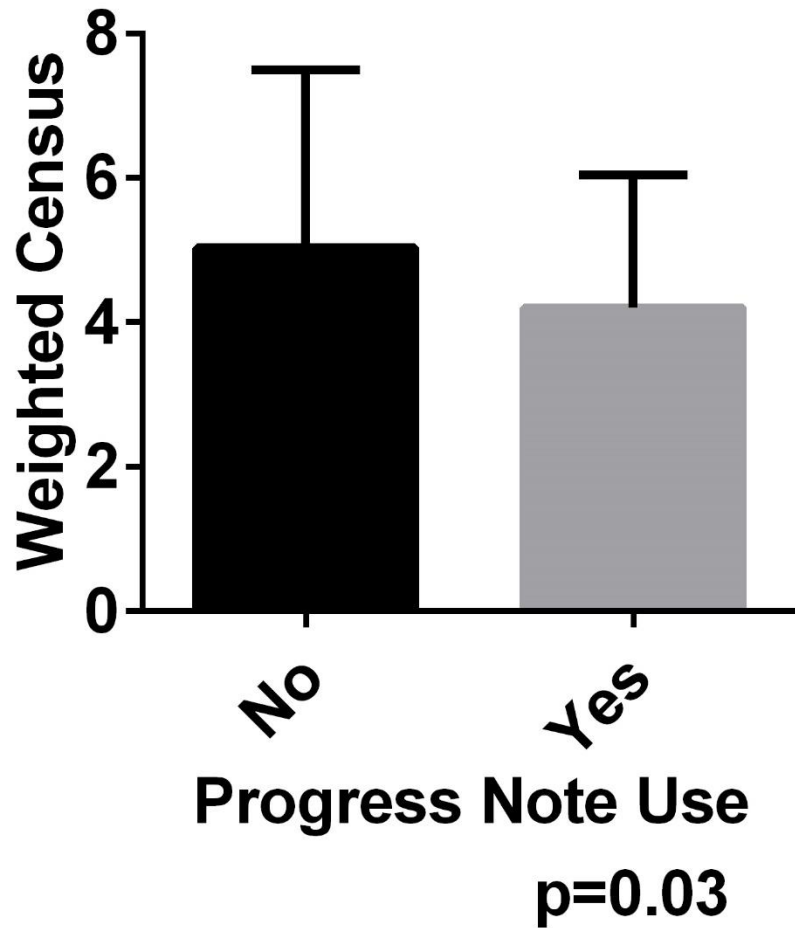
Solution?-Build a Better Template

- ▶ Artifact composition is greatest predictor of verbalization failure
- ▶ Most data imported using macros
 - ▶ Caveat-Macros have greater rate of verbalization failure
- ▶ Created a new progress note template with macros embedded to account for data at highest risk for error
- ▶ Used simulation as part of Intern bootcamp to introduce template.

Simulation Helps-Workload Hurts



Impact of Individual Workload on Artifact Use



Example #2- Does COVID-19 Impact Response To Portal Messages

- ▶ Premise: Large number of patient portal messages have delays in answering
 - ▶ Volume of portal messages associated with provider burnout
- ▶ COVID-19 forced transition to virtual care.
 - ▶ Massive increase in portal message
- ▶ Epidemiologic studies already documented increased mortality for non COVID-19 related disorders

Example #2- Does COVID-19 Impact Response To Portal Messages

- ▶ Data-Pulled all portal messages from EPIC from Jan 2020.
 - ▶ Set data elements to defined COVID vs NON-COVID messages
 - ▶ Time stamp for when message sent, opened and responded to
- ▶ Analysis-code each message as COVID vs Non-COVID query
- ▶ Problem- 2.5million messages and output from EPIC makes it impossible for automatic analysis-
 - ▶ Each carriage return is a new line in CSV File

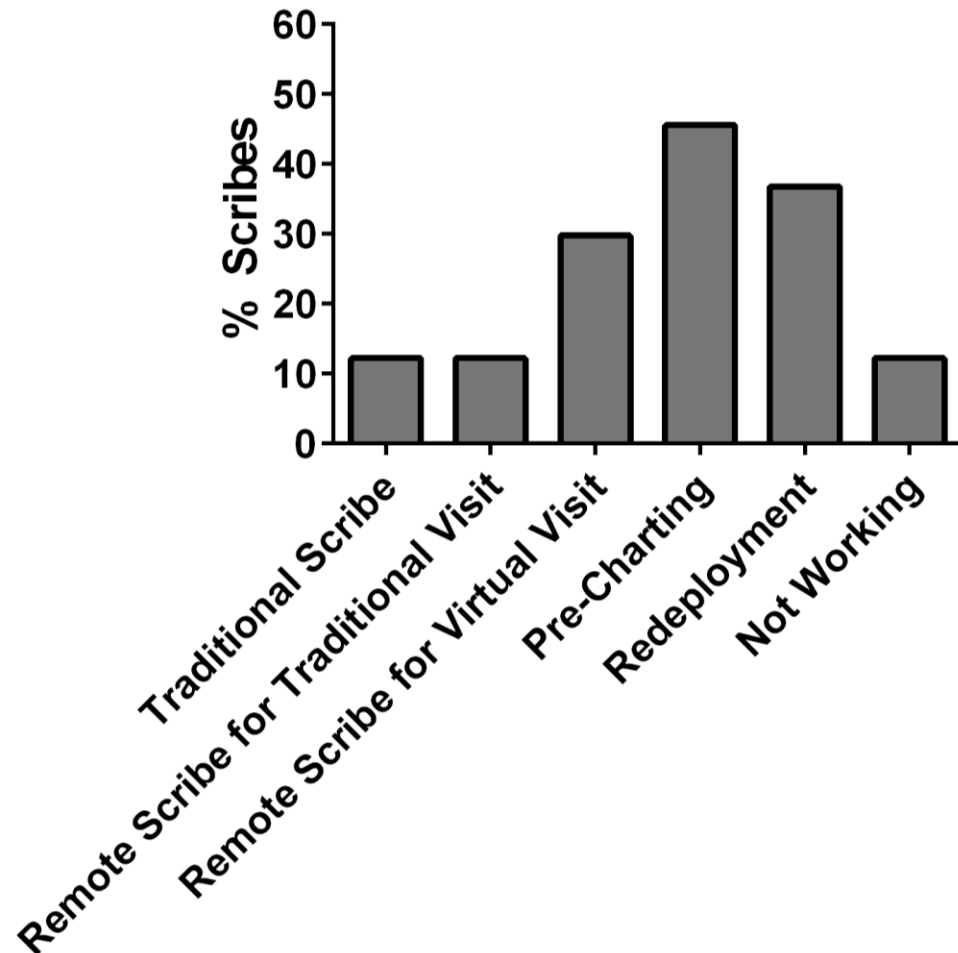
Upcoming Projects-COVID-19

- ▶ Impact of COVID-19 on Medical Scribe Function
- ▶ Impact of isolation of time to CTA in patients with PE
- ▶ Delay in response to patient portal messages
- ▶ Assessment of charge capture for virtual visits

What Are Our Medical Scribes Doing?

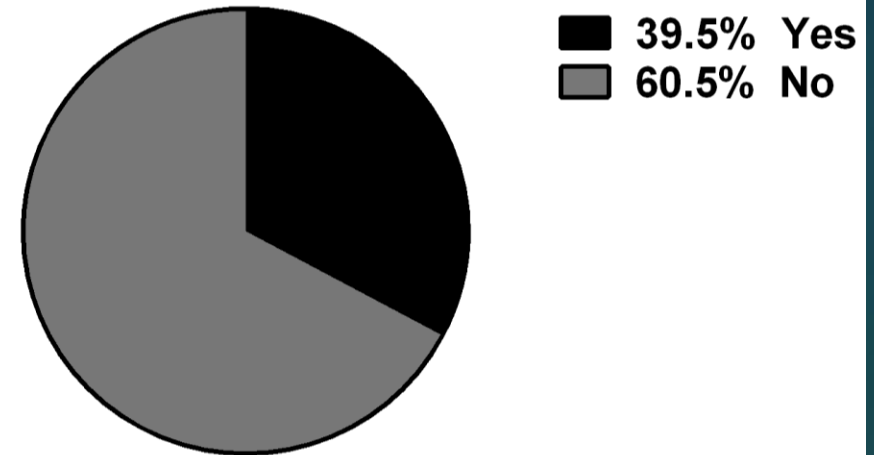
A.

Change in Scribe Workflow



B.

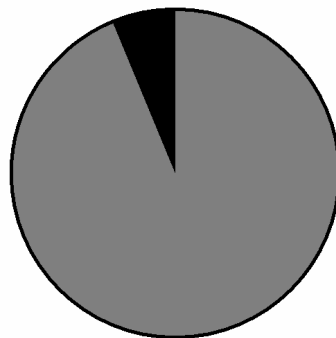
Required New EHR Skills



What Are Our Medical Scribes Doing?

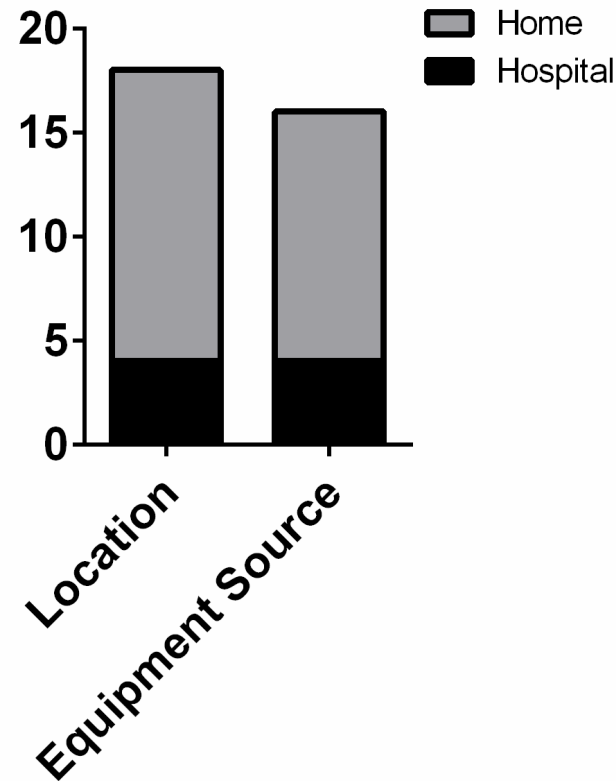
A.

Type of Remote Scribing

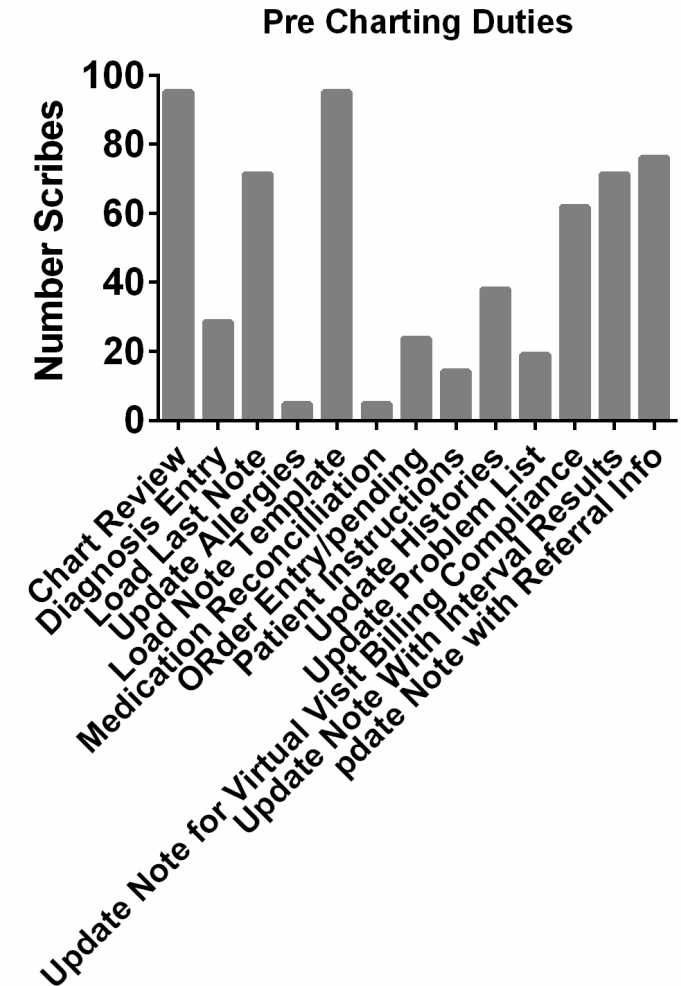


93.75% Tele
6.25% Virtual

B.



C.



Conclusions

- ▶ Quality and Safety are sciences, and basic scientific methods is still at the core
- ▶ Key to academic success is adherence to these principles
- ▶ The same skills are required for system change- Reporting of data is reporting of data
- ▶ Know your stakeholders and their priorities