

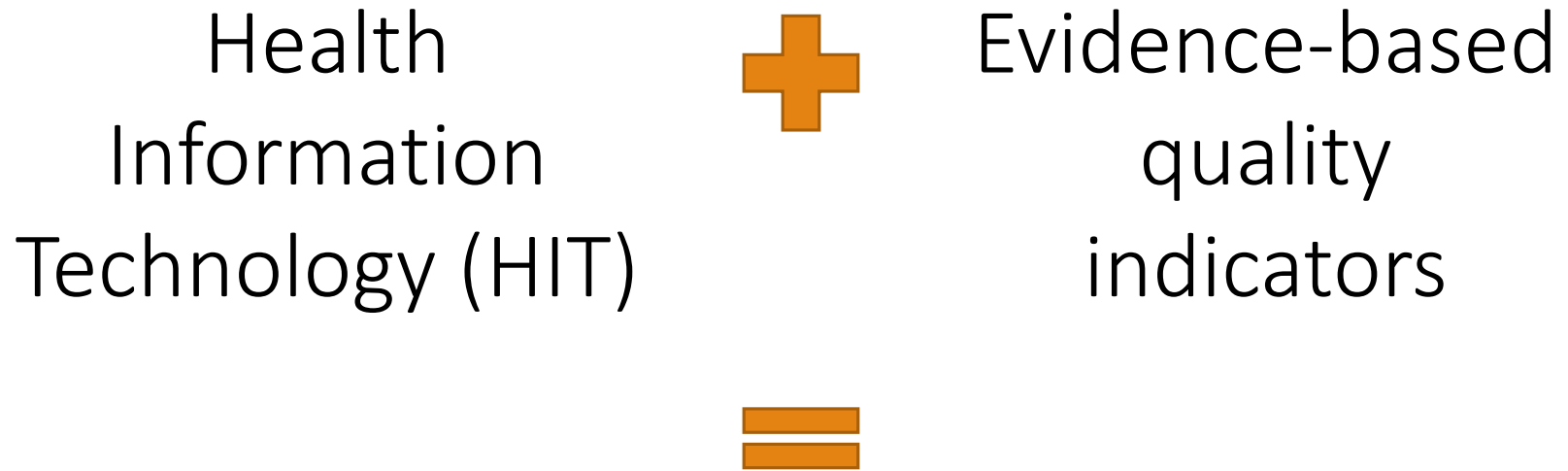
Implementing Evidence-based Quality Indicators into a Health Information Technology Dashboard

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*4TH ANNUAL I-PRACTISE CONFERENCE
APRIL 24-26, 2016 MADISON, WI*

Motivation



“Substantial reductions in the incidence and severity of medical errors”

Evidence-based Indicators



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Measures by Topic

Browse topics to find measures represented in NQMC that are linked to a particular term derived from the U.S. National Library of Medicine's (NLM) [Medical Subject Headings \(MeSH\)](#), a controlled vocabulary for disease/condition, treatment/intervention, and health services administration. MeSH is one of the controlled vocabularies included within the Unified Medical Language System (UMLS) ([what's this?](#))

MeSH terms are arranged hierarchically ranging from broad headings to more narrow concepts. For example, the general concept "Nervous System Diseases" can be followed through the MeSH hierarchy down to the concept "Myasthenia Gravis, Neonatal;" the broad concept "Diagnostic Techniques, Digestive System" can be followed through "Endoscopy, Gastrointestinal" to the narrow concept "Sigmoidoscopy."

Disease/Condition	Treatment/Intervention	Health Services Administration
<ul style="list-style-type: none">▶ Anatomy (2)▶ Organisms (12)▶ Diseases (1556)▶ Chemicals and Drugs (6)▶ Analytical Diagnostic and	<ul style="list-style-type: none">▶ Anatomy (40)▶ Organisms (2)▶ Diseases (21)▶ Chemicals and Drugs (432)▶ Analytical Diagnostic and	<ul style="list-style-type: none">▶ Analytical, Diagnostic and Therapeutic Techniques and Equipment (208)▶ Psychiatry and Psychology (6)

Problem and Objective

Problem

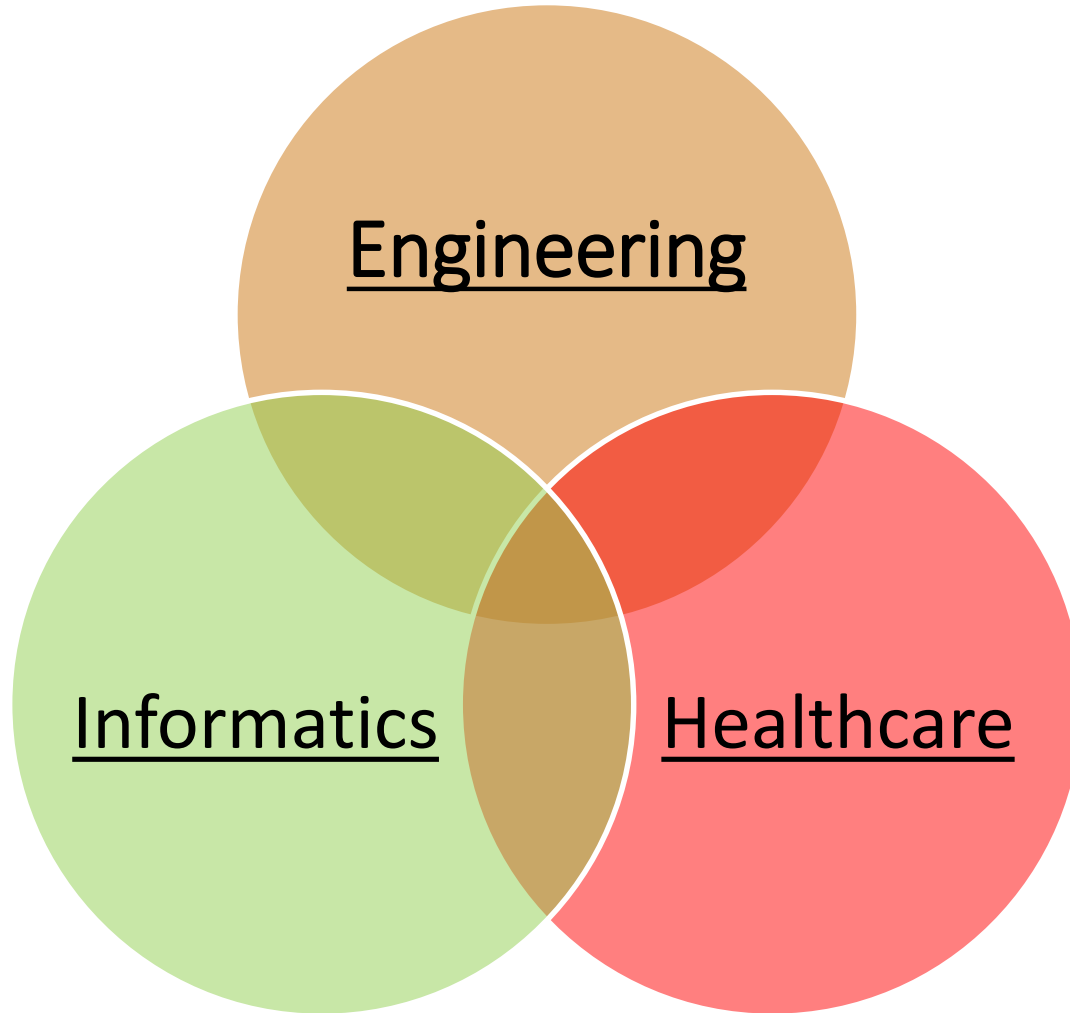
Lack of HIT systems using evidence-based indicators in the clinical environment

Objective

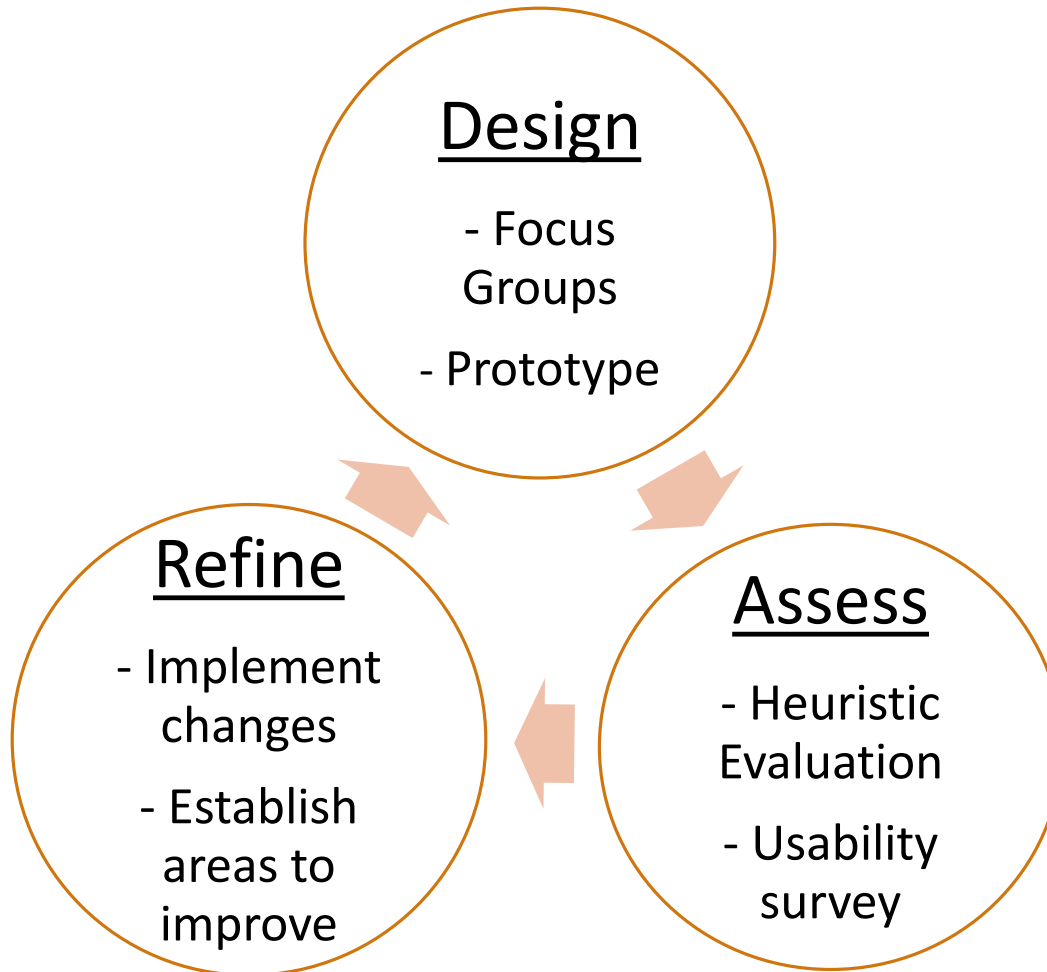
Design a HIT dashboard to communicate patient risk information to hospital care staff

While keeping Human Factors principles in mind!

Approach



Approach



Design: Focus Group

- Eight medical surgical unit staff members
 - 4 nurse managers and nurses
 - 2 physicians
 - 2 hospital quality professionals
- Questions to facilitate discussion
 - Which quality indicators to include?
 - How would you prefer quality indicators be presented?
 - Previous experiences with health information technology?
- Used responses to design the prototype dashboard

Design: Focus Group

Patient

- Patient name
- Unit number
- Bed number
- Attending Physician
- Length of Stay

Quality Indicators

- Pain Acceptable?
- Barthel Index
- Fall Risk?
- Restraint in Use?
- Pressure Ulcer Risk?
- Number of Urinary Cather Days
- Readmission in last 30 days?

Status

- When was the system last updated
- Who made last changes
- Indicator trends

Design: Prototype

HT Dashboard.xlsx - Microsoft Excel

MRN	Unit	Room	Bed	Last	First	Physician	Length of Stay (Hr)	Central Line Day	Catheter Day	Foley Day	Readmission after 30 Days	Pain Acceptable?	Fall Risk	Pressure Ulcer Risk	Delirium Risk	Restraint use
72274222	7JCW	7378	40	Perry	Katy	Smith	238.5					Acceptable	Absent	Absent	Absent	Absent
3723860	2RCW2	2056	48	Jenner	Bruce	Smith	191.03					Acceptable	Absent	Absent	Absent	Absent
7177239	6RCE	6069	51	Clooney	George	Wallace	99.38					Acceptable	Absent	Absent	Absent	Absent
3542877	LDR	LDR	17	Elliot	Missy	Thor	4.25					Acceptable	Absent	Present	Absent	Absent
6815054	4JPE	4776	86	Spacey	Kevin	Q	82.22					Acceptable	Absent	Absent	Absent	Absent
7177801	6JPP	19-6735	2	Lawrence	Jennifer	Cyrus	92.68					Acceptable	Absent	Absent	Absent	Absent
31965342	6JPP	10-67		Keaton	Diane	MacIntyre	82.35					Acceptable	Absent	Absent	Absent	Absent
97827916	7JCW	7335		Keaton	Diane	MacIntyre	170.55					Acceptable	Absent	Absent	Absent	Absent
5856747	7JCW	7377	60	Keaton	Diane	MacIntyre	217.62					Acceptable	Absent	Absent	Absent	Absent
2946592	4RCE1	4058	21	Roberts	Julia	West	17.08					Acceptable	Absent	Absent	Absent	Absent
6059004	6JPP	11-6765	28	Murray	Bill	MacIntyre	72.05					Acceptable	Absent	Absent	Absent	Absent
93345563	3RCW	3082	41	Streep	Meryl	Cent	18.4					Acceptable	Absent	Absent	Absent	Absent
96726909	4RCW	4046	98	Hutcherson	Liam	Wallace	73.52					Acceptable	Absent	Present	Absent	Absent
62059473	4JPE	4782	29	Worthington	Sam	Smith	23.4					Acceptable	Absent	Absent	Absent	Absent
5526334	3BT2	BT3043	71	Bob	Robert	Cyrus	978.87					Acceptable	Absent	Absent	Absent	Present
96660406	7JCW	7375	52	Broderick	Matthew	Smalls	145.92					Acceptable	Absent	Absent	Absent	Absent
89066414	2JPW	2784	61	Parker	Sarah	Meadows	27.92	4				Acceptable	Absent	Absent	Absent	Absent
7157319	2JPW	2782	56	Parker	Peter	Chase	94.9				N	Acceptable	Absent	Absent	Absent	Absent
99251104	6JPP	04-6776	66	Cruise	Tom	Smalls	80.83	2				Acceptable	Absent	Absent	Absent	Absent
97170332	1JPW	1793	58	Holmes	Katie	Chase	320.82					Acceptable	Absent	Absent	Absent	Absent
7046406	1JPW	1791	77	Neeson	Liam	Meadows	1024.43					Acceptable	Absent	Absent	Absent	Absent
5913998	6JCW	6326	67	Wendt	George	Murphy	23.57					Acceptable	Absent	Absent	Absent	Absent
7133157	2JPE	2746	15	Paltrow	Gwenyth	Q	193					Acceptable	Absent	Absent	Absent	Absent
7121295	3BT2	BT3048	79	Hanks	Colin	Q	60.26				Y	Acceptable	Absent	Present	Absent	Absent
97314147	4RCE1	4068	3	Macconahay	Matthew	Pitt	247.47					Acceptable	Absent	Present	Absent	Absent
77261266	3RCW	3045	26	Leno	J	Murphy	15.93				Y	Acceptable	Absent	Absent	Absent	Absent
93048544	3RCW	3095	81	Gyllenhal	Maggie	Smith	29.75					Acceptable	Absent	Absent	Absent	Absent
98605563	4RCE1	4067	47	Carvey	Dana	Smalls	74.23					Acceptable	Absent	Absent	Absent	Present
7011362	6JCW	6364	69	Myers	Mike	Cent	115.12					Acceptable	Absent	Absent	Absent	Absent
98605563	3JPW	3788	46	Hart	Kevin	Bullocks	26.32					Acceptable	Absent	Absent	Absent	Absent

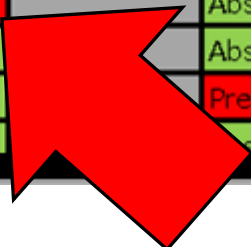
Legend:

- Decreasing Risk
- Increasing Risk
- Data Not Updated
- Risk Present
- Risk Absent
- Risk Unknown

Patient Quality Indicators

Design: Prototype

Readmission after 30?	Pain Acceptable?	Fall Risk	Pressure Ulcer Risk	Delirium Risk	Restraint use		
	Acceptable	Absent ↑	Absent		Absent	↓	Decreasing Risk
	Acceptable	Absent ↑	Absent ⚠		Absent	↑	Increasing Risk
	Acceptable	Absent ↑	Absent ↑		Absent	⚠	Data Not Updated
	Acceptable	Absent	Present		Absent ⚠	█	Risk Present
	Acceptable ↓	Absent ↑	Absent ↓		Absent	█	Risk Absent
	Acceptable ↑	Absent	Absent ↑		Absent	█	Risk Unknown
	Acceptable ↓	Absent	Absent		Absent		
	Acceptable ⚠	Absent ↑	Absent ↑		Absent		
	Acceptable ↓	Absent	Absent ↓		Absent		
	Acceptable ↓	Absent ↑	Absent		Absent		
	Acceptable	Absent ⚠	Absent ⚠		Absent		
	Acceptable	Absent ↑	Present ↓		Absent		
	Acceptable	Absent ↑	Absent ↑		Absent		
	Acceptable ↓	Absent	Absent ↓		Present		
	Acceptable ⚠	Absent ↑	Absent ↑		Absent		



Status

Assess

Heuristic Evaluation Recommendations

- Include a cover sheet to describe goal of display
- Remove quality indicator scores when they may be shown as present vs. absent
- Length of stay indicator in days rather than hours

System Usability Score

- Mean score of 83 (SD = 7.6)
- Prototype was “good”, but with potential for improvement

Refine: Integrate into EMR

Detail		PHD Summary														
N	U	R	Bed	A	Pain	Fall Risk	Braden	Delirium Risk	Barthel	Restraint	Urine Cath Days	CVC Days	LACE	Re-admit	Act LOS	Exp LOS
7	4	4	2	L	Acceptable	9	19	0	45				9		1	5
				L												
8	4	4	1	H	Acceptable	3	22					3	9		4	17
				M												
0	4	4	1	H	Acceptable	2	22					5	6	0 days	6	4
				M												
0	4	4	1	H	Acceptable	4	22					14	15	0 days	16	17
				M												
0	4	4	1	H	Acceptable	4	23					0	9	0 days	17	22
				M												
0	4	4	1	T	Not acceptable	5	18	0	90				6		3	5
				C												
0	4	4	1	H	Acceptable	14	17	0	55			14	10		14	22
				M												
9	4	4	1	L	Not acceptable	10	14	0	70		5		9	17 days	6	4
				L												

Assess

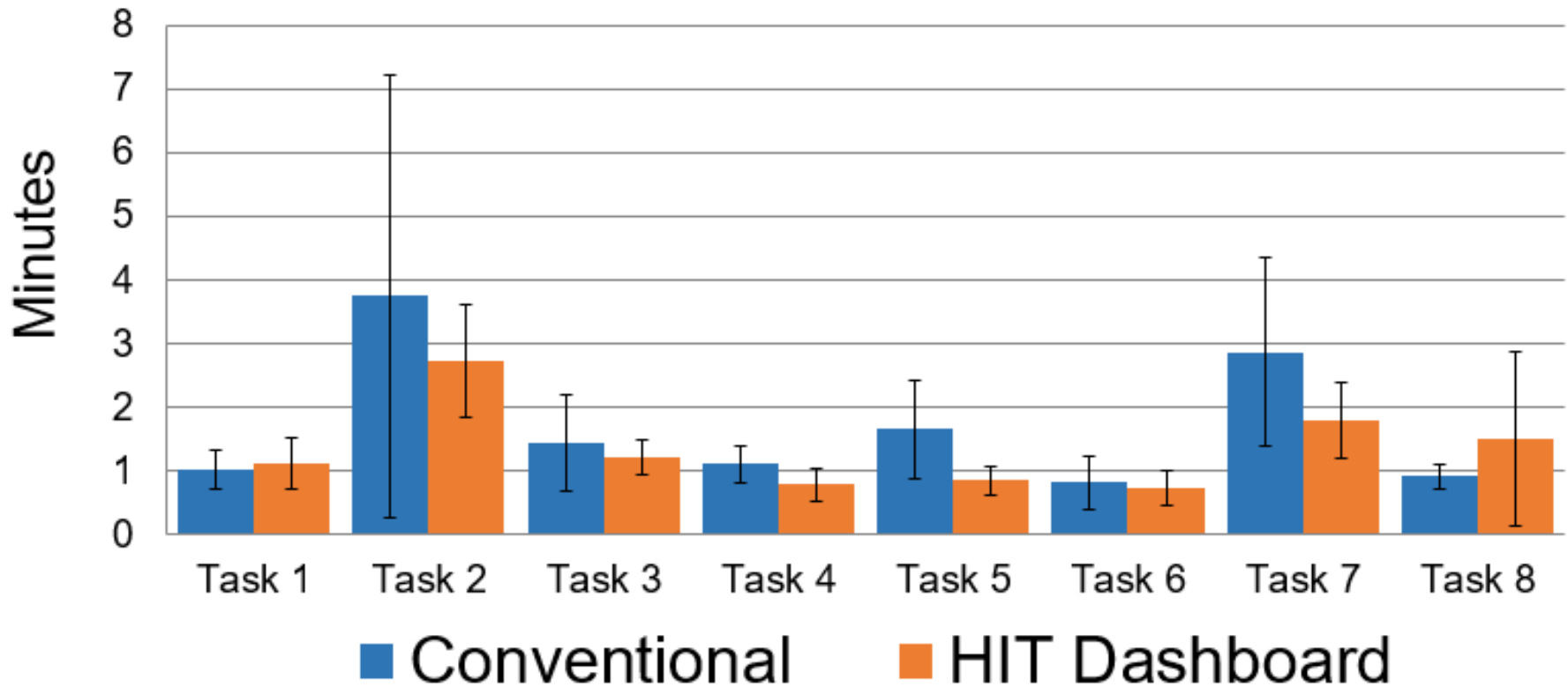
Task Time and Accuracy Trials

- Three nurse pairs and one physician from medical-surgical areas
- Eight multi-step tasks
- Recorded and evaluated

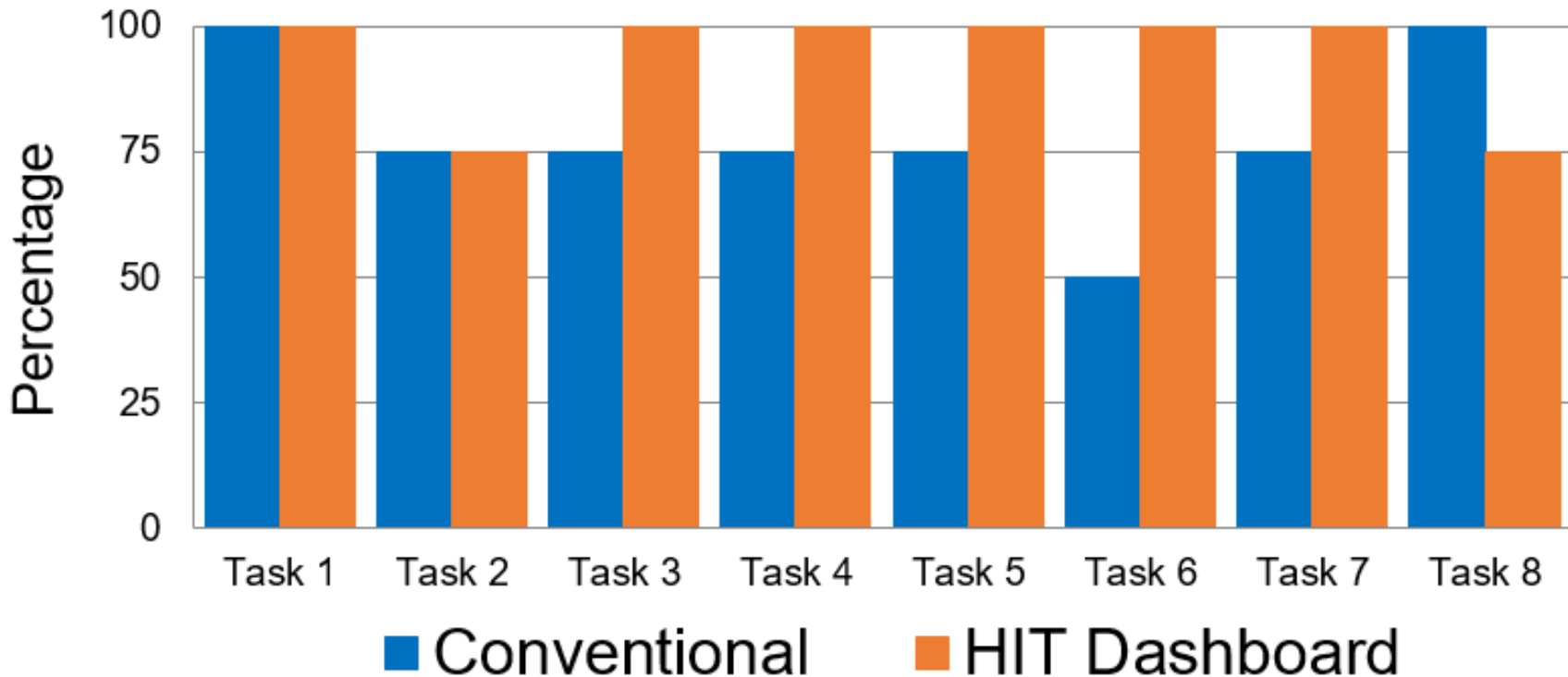
System Usability Score

- Mean score of 87.5 (SD = 9.6)
- Improved 4.5 points since Assessment 1, but still room for improvement

Assess: Time on Task



Assess: Tasks with No Errors



Assess: Qualitative

“The dashboard was mostly self-explanatory, hence easy to use and learn.”

“The dashboard removes all the clutter. The visual aspect of the system provides information at-a-glance for multiple patients.”

Refine: Pilot Implementation

- Chief nurse is funding installation in 11 units
- Implementation Process (Cullen & Adams, 2012)
 - Installation
 - Nurse manager / physician training
 - Introduction at each unit's council meeting
 - Participation in daily huddles & JIT training
 - Follow-up on programming issues/questions
- Prospective assessment to follow

Questions and Comments

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