



U.S. Department of Health and Human Services



Agency for Healthcare Research and Quality

Advancing Excellence in Health Care • www.ahrq.gov

A National Web Conference on Using Health IT to Support Improvements in Clinical Workflow

Presented By:

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Moderated By:

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Agency for Healthcare Research and Quality

July 29, 2015



Agenda

- Welcome and Introductions
- Presentations
- Q&A Session with Presenters
- Instructions for Obtaining CME Credits

Note: After today's Webinar, a copy of the slides will be emailed to all participants.



Presenters and Moderator Disclosures

The following presenters and moderator have no financial interest to disclose:

- Keith Butler, Ph.D., M.S.
- Amy Franklin, Ph.D.
- Teresa Zayas Cabán, Ph.D.

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- At any time during the presentation, type your question into the “Q&A” section of your WebEx Q&A panel.
- Please address your questions to “All Panelists” in the dropdown menu.
- Select “Send” to submit your question to the moderator.
- Questions will be read aloud by the moderator.

The screenshot displays the WebEx interface with the 'Q&A' section open. At the top, there are tabs for 'Participants', 'Chat', and 'Q&A'. The 'Q&A' tab is selected, showing a 'Speaking:' section with 'Panelists: 2' and 'Attendees:'. Below this is a 'Q&A' section with a dropdown menu set to 'All (0)'. A red arrow points to the 'All Panelists' option in the dropdown. Below the dropdown is a text input field with a placeholder message: 'Select a participant in the ask menu first and type your question here. There is a 256 character limit.' A 'Send' button is located to the right of the input field.



Learning Objectives

At the conclusion of this activity, the participant will be able to:

1. Discuss the ability of clinical workflow analysis to increase the likelihood of a successful health IT intervention that improves efficiency and quality of care in three clinical settings.
2. Describe the relationship between cognitive burden and workflow in an emergency department setting and the potential for health IT to support effective decision making.



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Workflow for Evidence-based Health IT

Keith A. Butler
University of Washington



Our Multidisciplinary Team

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- **Cui Tao**, Ph.D.
Co-I for knowledge modeling
- **Mohcine Madkour**, Ph.D., Post-Doc



Today's Agenda

- Need: Predictably beneficial health IT
- Basics of Business Process Modeling Notation (BPMN) standard for workflow diagrams
- Common disruption patterns of health IT
- Some examples and design fixes



Great Potential of Health IT is yet to be Realized

Inherent complexity of health care
+ Technical complexity of health IT

= *Risk of unpredictable impact*



Challenge and Background

Challenge

How can we represent the work of clinical care to analyze how it should be improved with health IT?

Background

People have been modeling human work since the industrial revolution, so there are many ways.



Recent Standard for Workflow Diagrams

- BPMN¹ is a standard of the Object Management Group.
- Purpose is to understand IT requirements for groups of people doing work that is supported by computing.
- Good match to clinical care
- Widely accepted and supported by more than 35 commercial modeling systems
- A good tutorial at

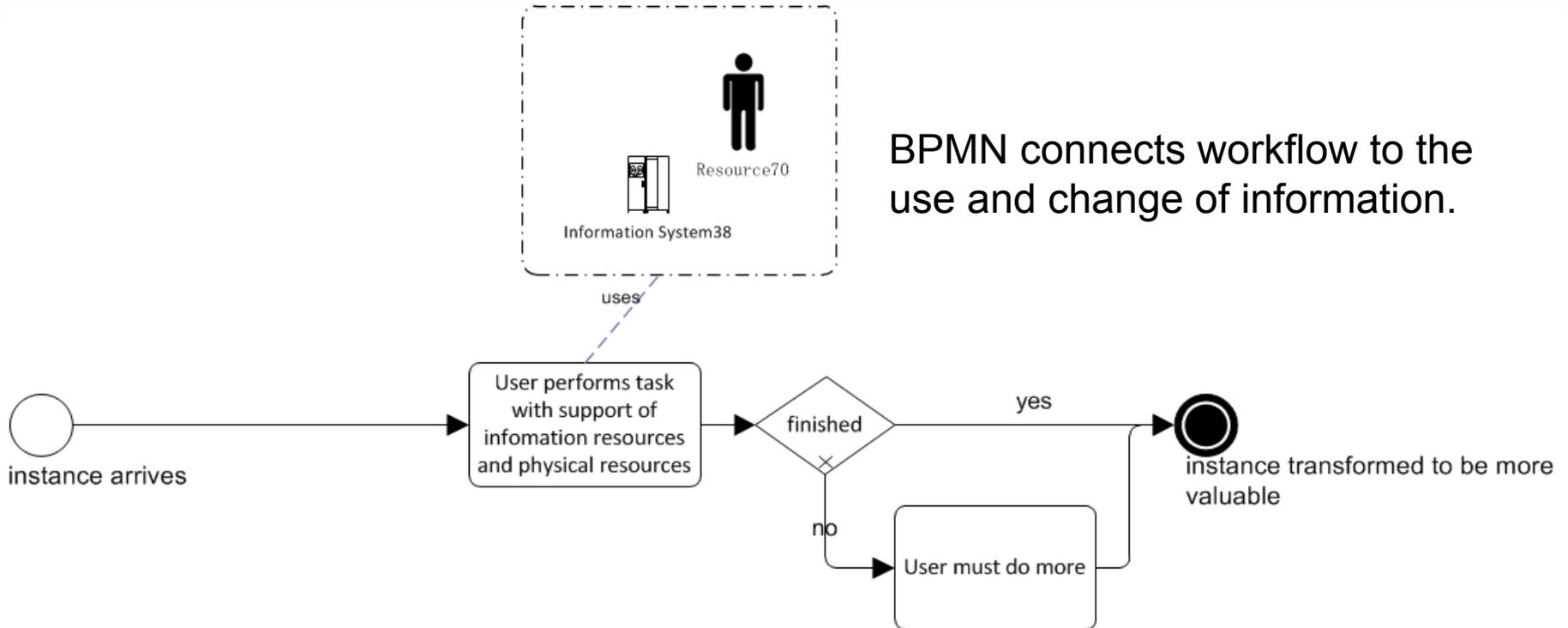
http://www.omg.org/bpmn/Documents/OMG_BPMN_Tutorial.pdf

“All models are wrong ...

but some are useful.”

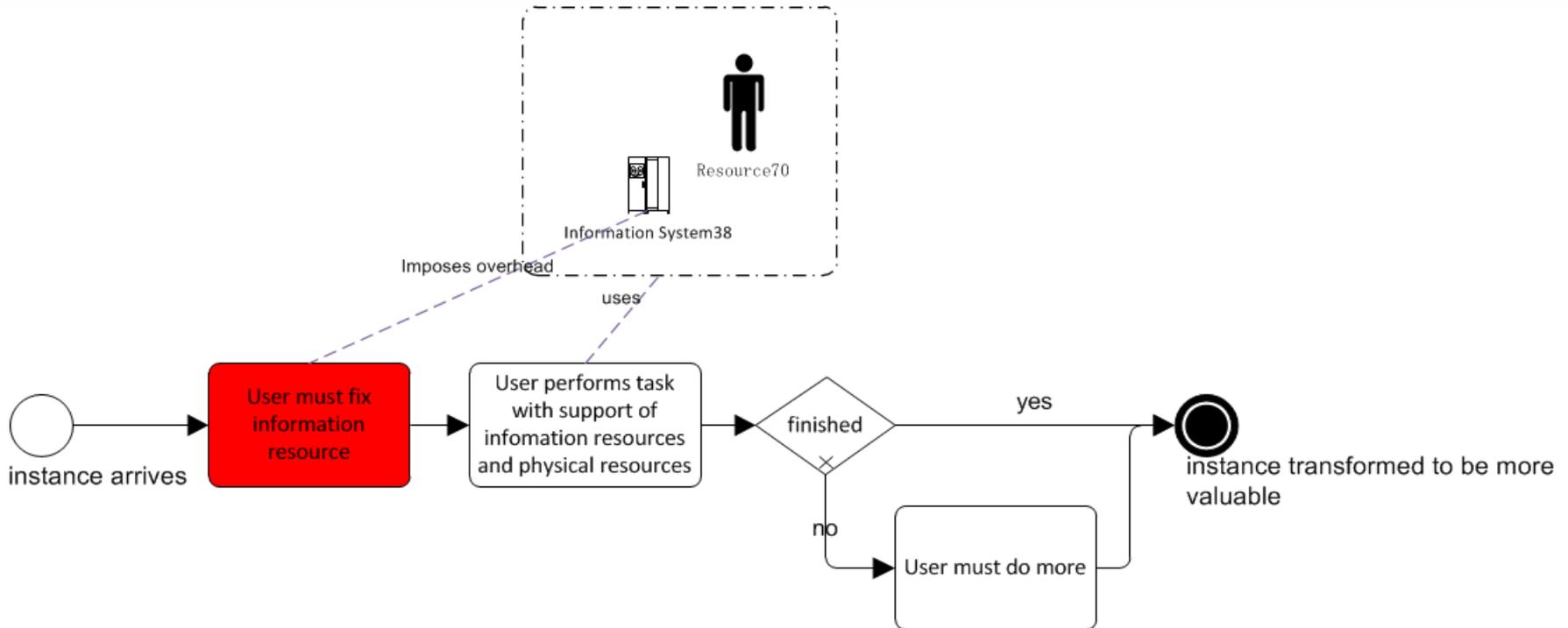
– *George Box, distinguished statistician*

Basic Workflow Modeling Concepts



BPMN connects workflow to the use and change of information.

BPMN Can Distinguish Value-Added Activity and Overhead



Computer overhead is more than just extra work.

It can disrupt cognition and disguise the true nature of care tasks.



Common Patterns of Disruption

Pattern	Compensation Examples
Info has different values in multiple systems or pages.	Check to determine authoritative source. Manually maintain consistency.
Info is in single source but doesn't match workflow.	Transcribe onto paper.
Needed pieces of info are spread across pages or multiple systems.	Transcribe onto paper, then integrate by hand onto notes.
All info is there all the time.	Ignoring cluttered pages. Alert fatigue.
Right content in wrong format.	Sketch a graph for a list of test results to detect trends. Mentally transform, estimate.
New info expected but time is unknown.	Checking, and re-checking. Post-It Note reminders.
Information is there but may be out of date.	Checking other sources. Calling. Guessing.
Partial automation	Re-do some tasks manually to overcome fractured awareness.



Example Workflow Problems and Design Fixes



Multiple Sclerosis (MS) Outpatient Clinic

- Sees over 300 advanced patients every 3 months
- Providers issue 1-10 orders from most exams.
- Different workflows to complete 11 distinct types of orders



MS Case Manager

Case complexity mandates a senior nurse coordinator (NC) for case manager to:

- Monitor and manage all treatment plans between exams.
- Review plan status and make appointment reminder calls.
- Primary focal point for any new problems for all MS patients.



Multiple Overlapping Information Resources of MS Case Management



Electronic health record

Treatment plan

Clinic schedule

1. MS - Referring pt to Neurology for further agent medications. Also to assess whether pt slow progression of symptoms. Per pt, MRI at 2. Left foot drop - ordering blue rocker AFO actively can get to neutral with knee bent. wear AFO as much as possible which may be di and shorts.
 3. Temp regulation: ordering cooling vest via 4. Equipment: ordering Bathroom Bench via O 5. Gait/Mobility: Referring pt to PT for ant and scooter for longer distances. PT to also work on fall risk.
 6. Neurogenic bladder: ordering Chem 7, Retroperitoneal US. Discussed use of condom cath but pt would like to use depends, stating he only has an accident occasionally. Would also rec 7. Spasticity/Tone: Ok to c spreading out dosage in futu medications if necessary (ie 8. Fatigue: pt ok with not t medication management in the
 RETURN TO CLINIC: 3-6 months comprehensive assessment (pt

Info	Patient	Location	Urgency	Alert Date/Time	Message
			Moderate		New consult MI
			Moderate		COMPLETED Adder
			Moderate		UNSIGNED TBI/Pol
			Moderate		Labs resulted - [STO
			Moderate		Labs resulted - [C DII
			Moderate		Abnormal labs - [ED 1
			Moderate		Labs resulted - [ED 1
			Moderate		Abnormal labs - [ED 1

Appointment list for: MULTIPLE SCLEROSIS (100/1D-149) For:

14:30
 HOME PHONE: WORK PHONE:
 PCP AND TEAM:
 * vet on f/up, sch sl remade appt for
 * Not currently enrolled in clinic.
 Alcohol Use Screening - DUE NOW
 Depression Screening - DUE NOW
 BMI >30 OR >24.99 in High Risk - DUE NOW
 Telehealth (CCHT) Referral - DUE NOW
 lessness Screening - DUE NOW

Who is coming at what time

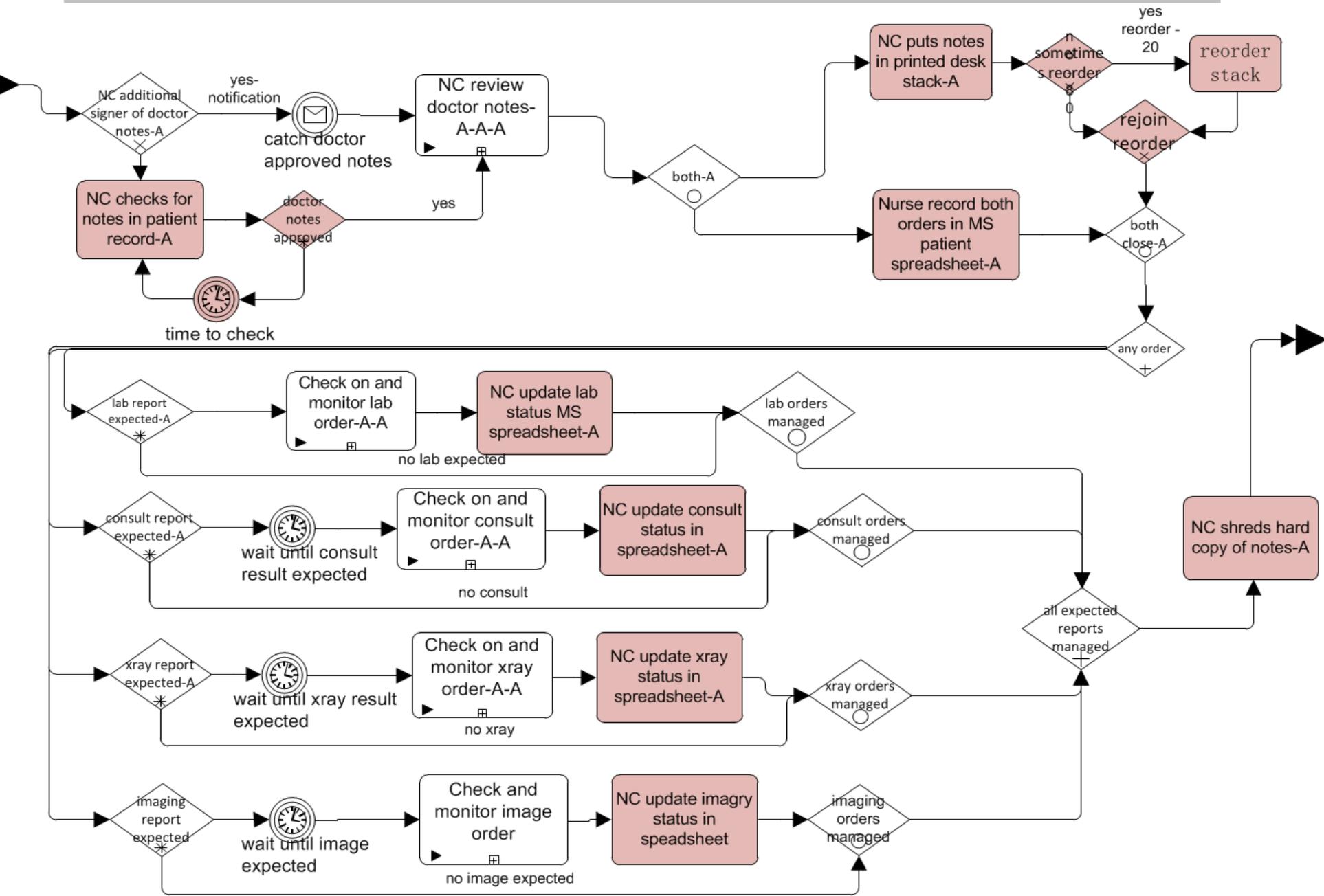
Last Seen	Labs/Imaging	Other Needs
/ / 2013		
/ / 2013		
/ / 2013		
/ / 2013	U/S / / 13	Urology Consult ordered. w/c clinic, OTO.
/ / 2012		
/ / 2012	nxt. visit: ck. labs	
/ / 2013	MRI. U/S.	ck. PVR's
/ / 2011	(Pt. did not get labs done.)	
/ / 2012	Labs ordered.	(Pt. has not sched. Ophtho. appt. yet.)
/ / 2013		Uro., OT, SLP, & Ophtho. ordered.

Next F/U Due
, 2013)
, 2013)
, 2013)
, 2013)
(/ / 13 - / / 13) emailed / / 13
(, 2012) e-mailed / /
(, 2013) / / / No Shows.
(, 2012) emailed / / 4
(, 2013)
(, 2013)

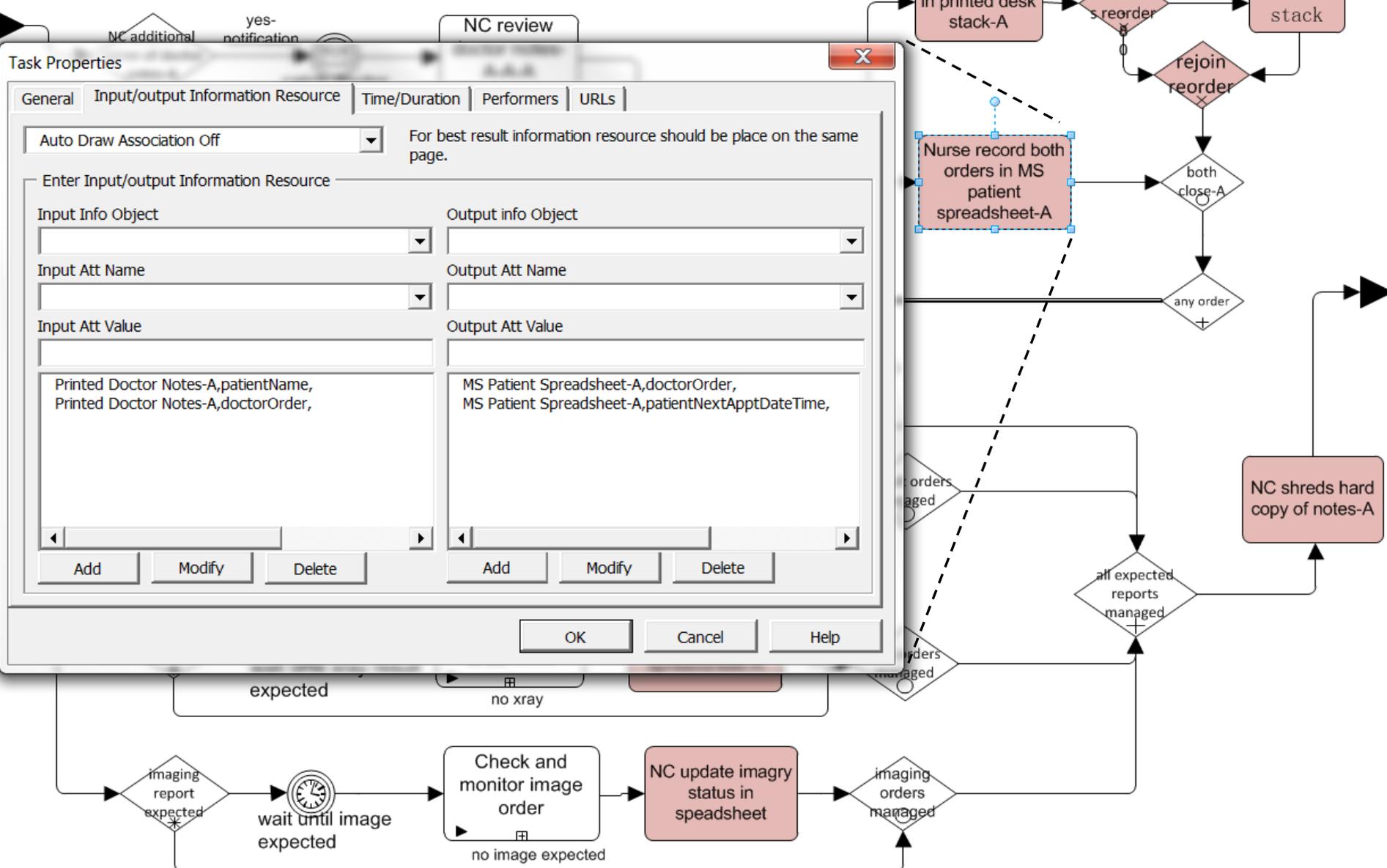
Statuses of treatment plans

Spreadsheet of all active patients

Process Nurse Coordinator post-visit MS care-A



Process Nurse Coordinator post-visit MS care-A



Task Properties

General | Input/output Information Resource | Time/Duration | Performers | URLs

Auto Draw Association Off For best result information resource should be place on the same page.

Enter Input/output Information Resource

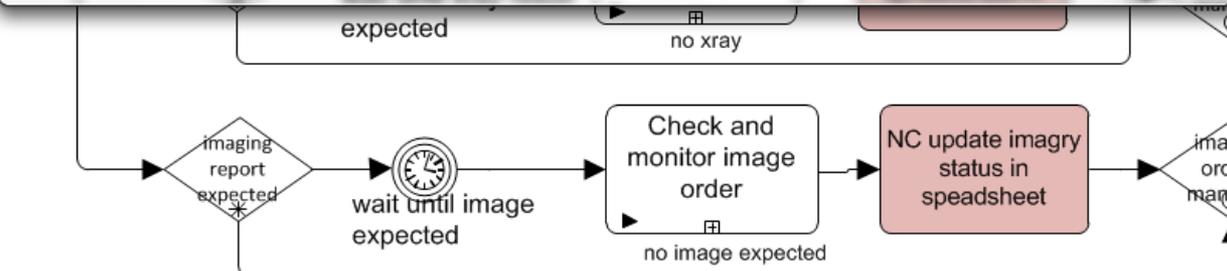
Input Info Object	Output info Object
Input Att Name	Output Att Name
Input Att Value	Output Att Value

Printed Doctor Notes-A,patientName,
Printed Doctor Notes-A,doctorOrder,

MS Patient Spreadsheet-A,doctorOrder,
MS Patient Spreadsheet-A,patientNextApptDateTime,

Add Modify Delete Add Modify Delete

OK Cancel Help





Screen Video Demo

Browser window: Patient Case Management System | localhost/~trevor/index.php | Google

Home - Patient Readiness Management - All Patients

SEARCH: Enter search name: [Search] | Set Effective Date: 2014-11-18

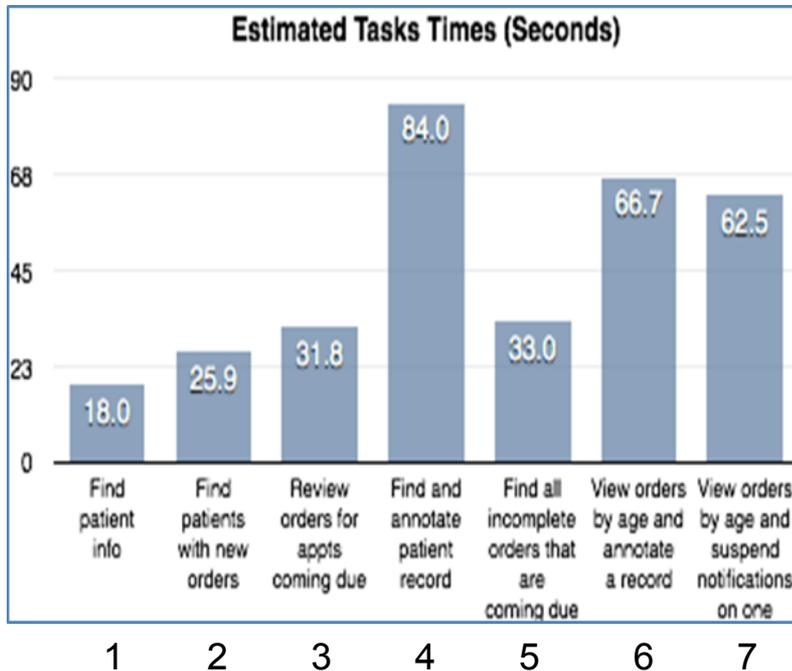
All Patients (Fictitious) [Add Patient]

New Orders	NAME	NEXT MS CLINIC VISIT	LAST MS CLINIC VISIT	ORDER / TASK AGE
	Abraham Bowen MRN#: 901000008 1969-04-15 Age: 44	2014-11-17	2014-08-19	2014-08-22 Consult,Imaging,Lab
	Amberly Delong MRN#: 901000011 1935-06-13 Age: 79	2015-02-20	2014-08-04	N/A N/A
	Cedric Palmer MRN#: 901000003 1949-04-11 Age: 64	2015-02-08	2014-11-10	2014-11-14 Consult,Medication
	Dana Phelps MRN#: 901000007 1959-04-15 Age: 54	2014-11-17	2014-08-19	2014-11-22 Consult
	Denny Hare MRN#: 901000016 1938-03-23 Age: 76	2015-02-20	2014-08-04	N/A N/A
	Elliot Marlowe MRN#: 901000017 1939-09-27 Age: 75	2015-02-20	2014-08-04	N/A N/A
New	Guadalupe Gonzales MRN#: 901000001 1940-04-15 Age: 73	2015-02-08	2014-11-10	2014-11-20 Imaging,Lab
	Henry Alexander MRN#: 901000005 1947-07-11 Age: 66	2015-02-03	2014-11-05	N/A N/A
	Jeanne Turner MRN#: 901000002 1940-04-15 Age: 74	2015-02-08	2014-11-10	2014-11-13 Equipment,Medication
	Kamala Herron MRN#: 901000009 1930-01-23 Age: 84	2014-11-17	2014-08-19	2014-08-27 Consult,Lab
New	Lawrence Cruz MRN#: 901000006 1969-04-15 Age: 44	2015-02-03	2014-11-05	2014-11-24 Imaging,Lab

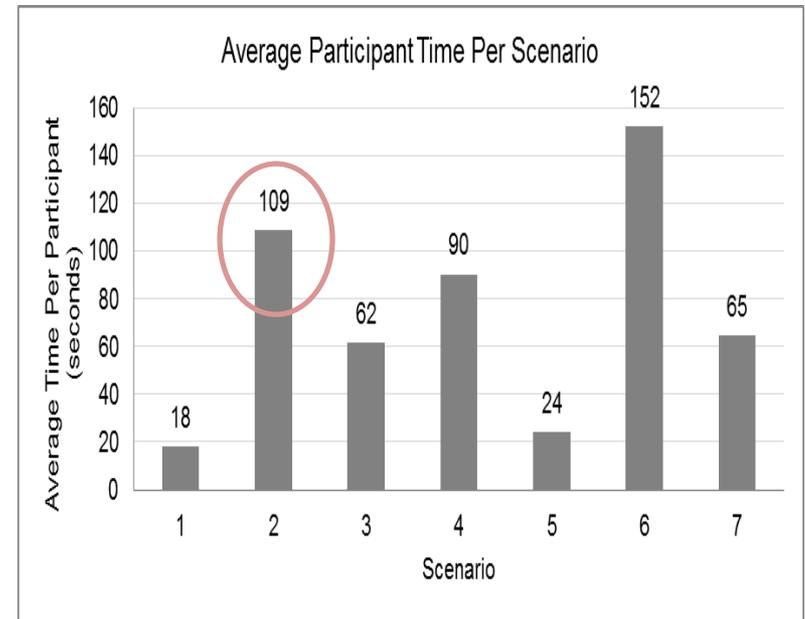


Usability Test Results for Use Cases

GOMS³ Estimate for Expert User



Empirical Task Times of 7 Sr. Nurses



GOMS- Goals, Operators, Methods, and Selection rules

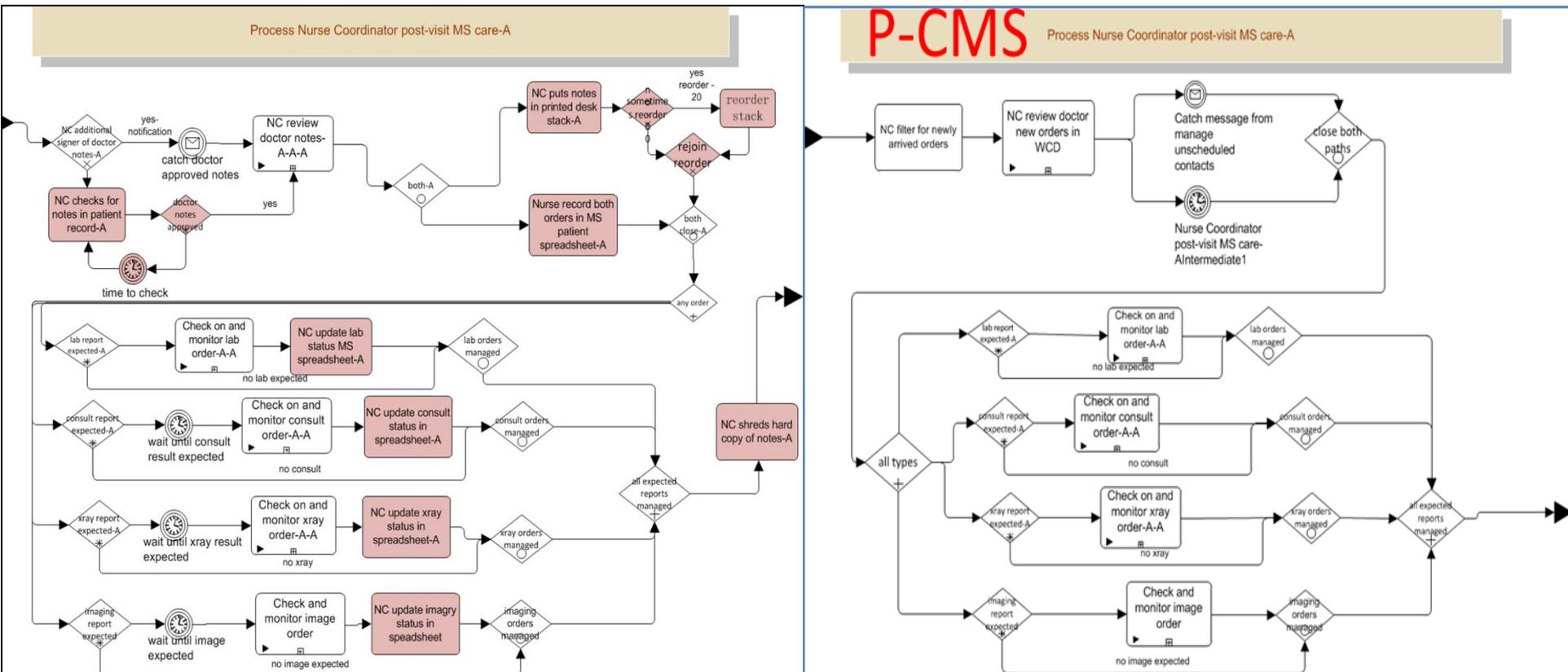


Reduced Overhead Tasks: Managing Treatment Plans

As-is

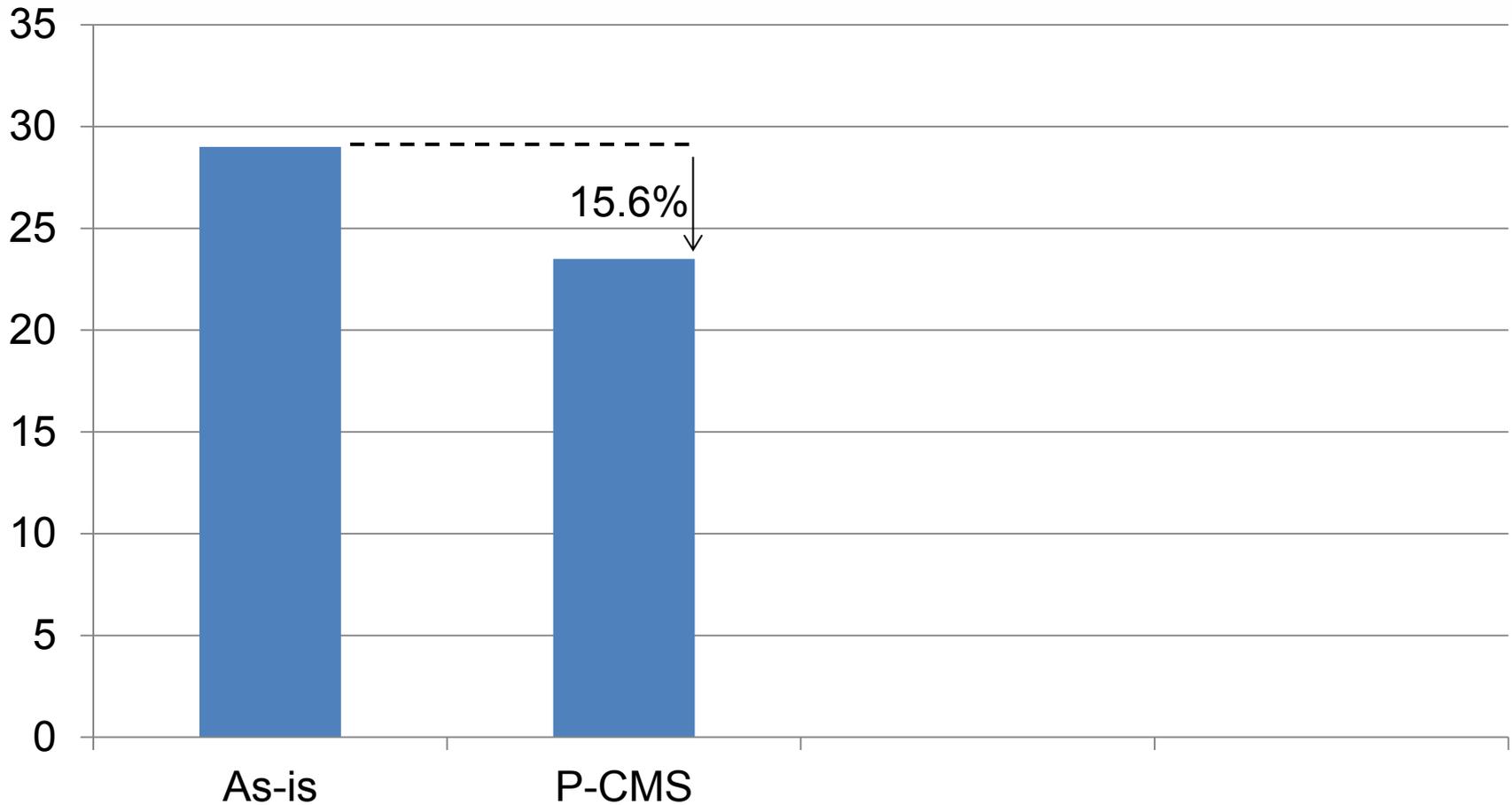
vs.

P-CMS





Time-Savings Simulation: Hours per 80 Patients





Additional Expected Benefits

- Improved situational awareness for case-managers, providers, patients and their families
- More timely completion of orders
- Increased quality of information
- Clinicians can work at/near the top of their skill level



Workflow Conclusions

Workflow helps understand existing care before you try to improve it!

- Should be a part of IT design to avoid common disruption patterns
- BPMN offers a widely practiced standard for workflow diagrams
- Makes a connection between health IT and care benefits



Great systems are not supposed to be easy to *design* -
they're supposed to be easy to *use*.



References

1. White S & Miers D. BPMN Modeling and Reference Guide. Future Strategies, 2008.
2. Butler KA,, et al. (2014) Advances in Workflow Modeling for Health IT. In: J. Zhang & M. Walji (Eds.) Better EHR: Usability, workflow and cognitive support in electronic health records. National Cent for Cognitive Informatics and Decision Making in Healthcare. pp. 159-186.
3. Kieras, D., & Knudsen, K. (2006). Comprehensive Computational GOMS Modeling with GLEAN. In Proceedings of BRIMS 2006, Baltimore, May 16-18, 2006.



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Opportunistic Decision Making, Information Needs, and Workflow in Emergency Care

**Amy Franklin, Ph.D.
University of Texas Health Science Center -
Houston**



Goals for Today

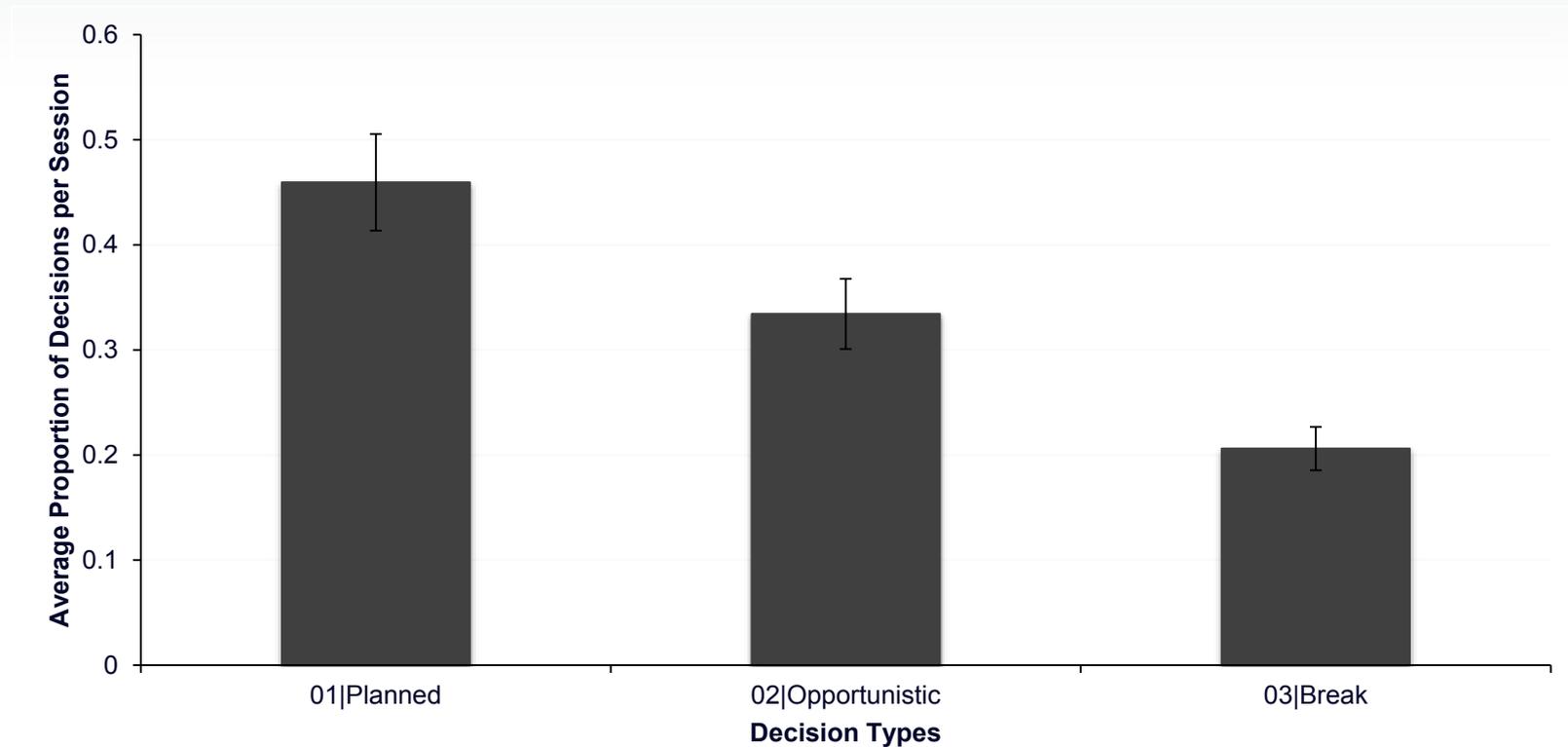
- Describe the relationship between cognitive burden and workflow in an emergency department (ED) setting.
- Discuss potential for health IT to influence opportunistic decision making.
- Discuss challenges in real-world solutions.
- Describe ongoing and future efforts.



Emergency Departments

- Complex, non-deterministic environment
 - ▶ You never know *who* is coming through the door.
 - ▶ You don't know *when* patients are coming in.
 - ▶ You may not know *what* resources you have at any moment, including staff, beds, supplies, etc.

Opportunistic Decision Making



Proportion of each type of decision made over the entire shift

Finding: Local Rules Govern Action



Opportunistic Decision Making (cont.)

- Observable impact of ED complexity on **work**
 - ▶ Interruption intensive environment
 - ▶ Verbal exchange of information
 - ▶ Opportunistic decision making

- Potential impact of opportunistic decisions on **care**
 - ▶ Potential risk of adverse events
 - ▶ Decreased quality of care/increased length of stay
 - ▶ Decreased satisfaction



Opportunistic Decision Making (cont.)

- We believe opportunistic decision making is triggered by environmental factors.
- Its impact on patient care is reflected by a decrease of productivity and increase of potential adverse events.
- Hypothesis: Improved situational awareness through visualizations will decrease opportunistic decision making and lead to increases in productivity, such as shorter lengths in stay.



Understanding the Work to Support Visualization

- To support decision making through visualizations, we need to understand the work of the clinical providers.
- We represent the work of the ED using a Work Domain Ontology (WDO).
- The WDO is a representation of clinical goals, information (as objects), clinical operations (i.e., activities) required for the care of patients and the constraints in this system.

Goal is an objective that needs to be achieved for the work domain

- Answer the essential question of why the work domain exists
- Attributes: hasID, hasName

Object is an entity towards which an operation is directed

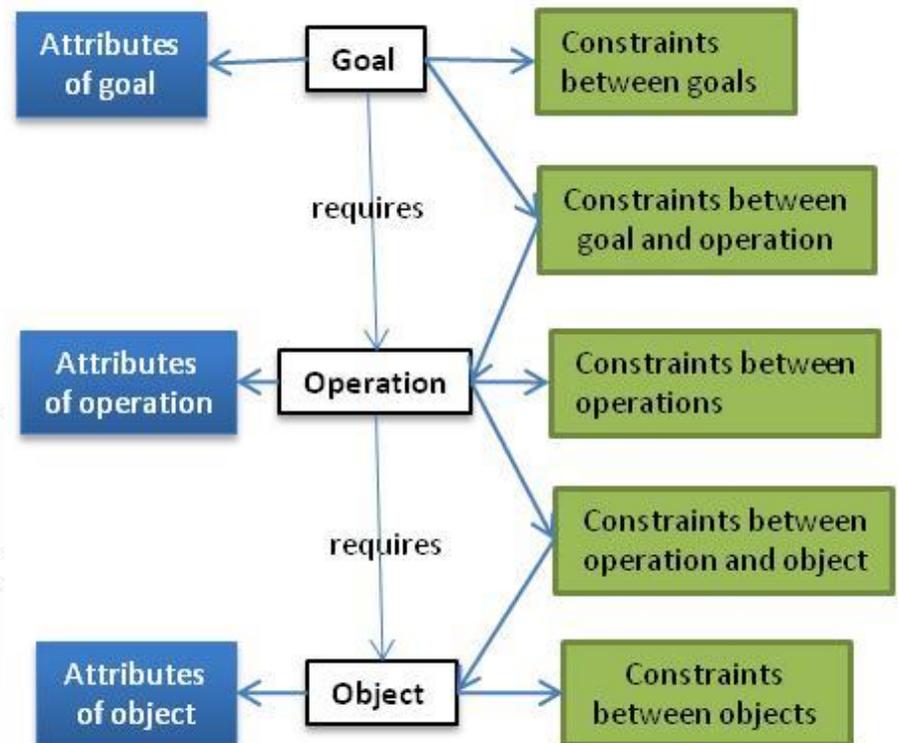
- Indicate the resources required for the work domain
- Attributes: hasID, hasName

Operation is a necessary activity towards the goal

- Identify the major activities in the work domain
- Attributes: hasID, hasName, hasStartState, hasEndState

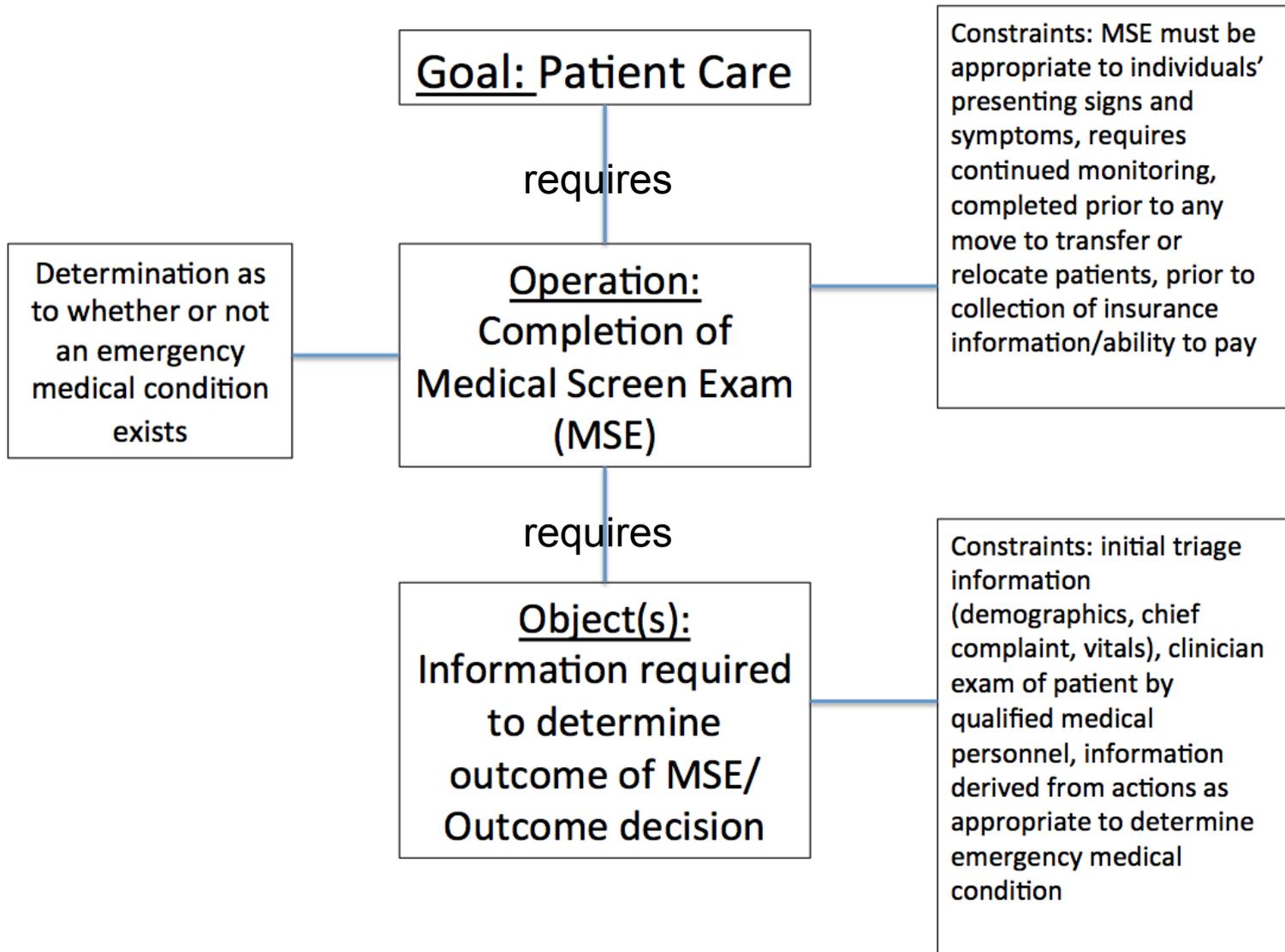
Constraint is a relation between two components and defines an explicit condition the work domain must satisfy

- Identify connections among the components
- Attributes: hasID, hasName, hasSubject, hasObject





WDO Example: Medical Screening Exam





Visualizations

- We believe human-centered visualizations can be systematically created by using the WDO to improve the ED's situational awareness.



Goal of Visualizations

- Improve situational awareness
 - ▶ Through the presentation of information as needed to support workflow
- Decrease cognitive burden on clinicians
 - ▶ Improve understanding
 - ▶ Support communication
- Alter patterns of opportunistic decision making.

All lead to improved outcomes.



Understanding Needs

- Observations, interviews, and input from different types of hospitals and providers
 - ▶ Trauma 1 to community centers
 - ▶ Teaching facilities, midlevel practice, rapid treatment area
 - ▶ High volume EDs/smaller attached hospitals



Understanding Needs (cont.)

- Ethnographic Observations
 - ▶ Attending physicians, residents, midlevel providers, nurses
- Interviews with medical directors, emergency department directors, clinical coordinators, charge nurses...
- Surveys across clinical roles
- Input from collaborative Team (5 ED physicians, 1 Physician Assistant, nurses)
- Working in conjunction with the ED collaborative for a hospital system
- Collaborative efforts with a hospital to deploy at 11 sites



Starting Point

Patient Overview

ESI	Waiting Room	
1		3
2		6
3		12
4		24
5		18

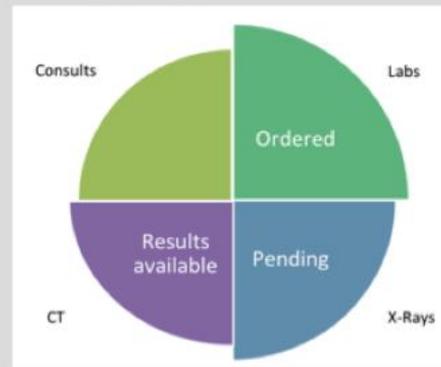
Trauma Beds		occu	open
Trauma	●●●●	4	0
Intake	●●●●	3	2
Chairs/Hallway	●●●●	0	8

ED Beds	
PEDI	●●●●
MED	●●●●
MED-CRIT	●●●●
TRAUMA	●●●●
ED Total	10 ●●●●●●●●●●

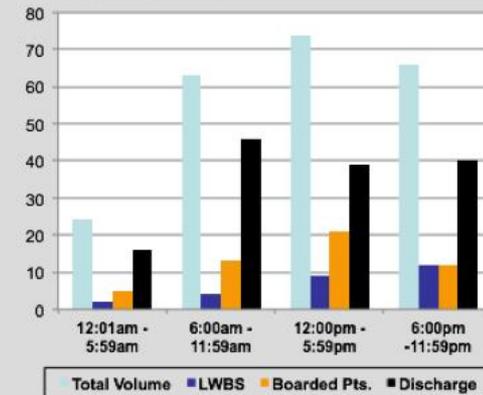
Hospital	
Trauma	██████████ 17%
MICU	██████████ 66%
Floor	██████████ 20%
CTICU	██████████ 20%

ED Staffing		
PEDI	1	2 4
MED	2	4 6
TRAUMA	1	3 4

ED Resources

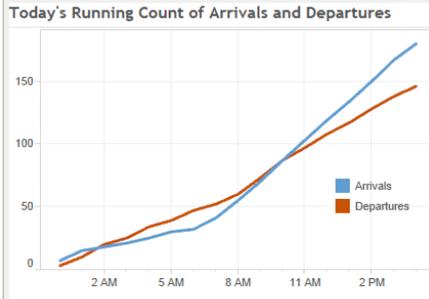


ED Total Volume





Historical Progression

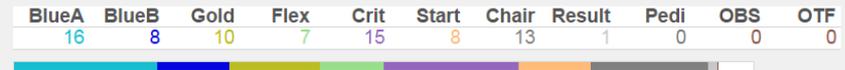


Saturation
Overcrowded
107

Total In ED **117**
Total In Care Area **78**



In Care by Pod



Incoming

Total Waiting **32**

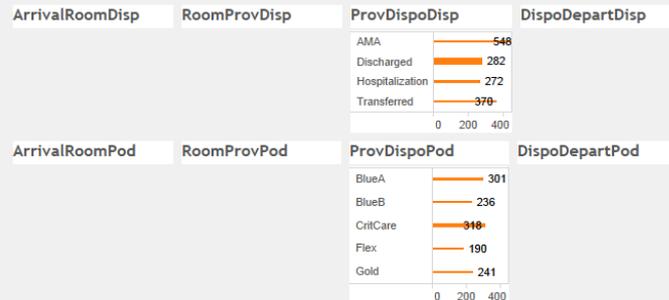
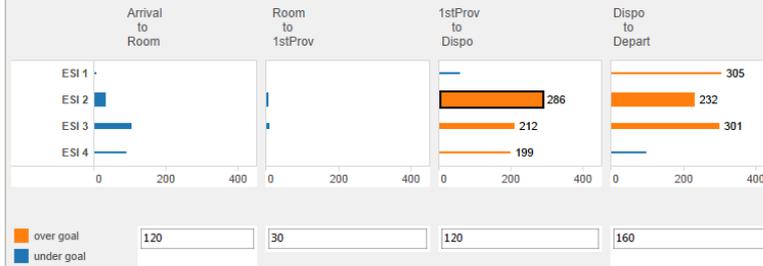


ShortWait: MediumWait:

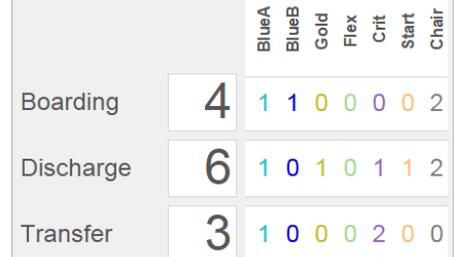
Now:

TotalEDSpots: HospitalBeds:

Current



Outgoing



Today's LWBS **14**
Today's LBTC **1**
Today's AMA **3**



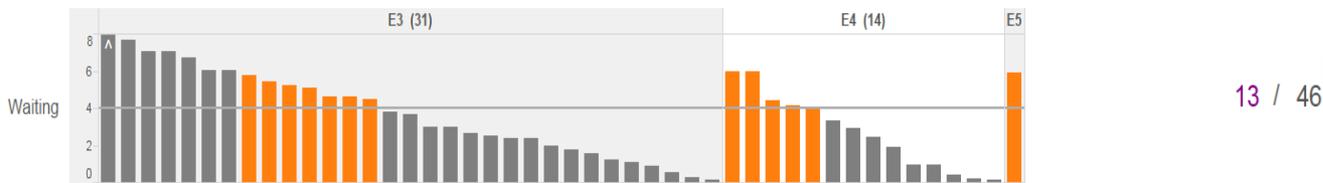
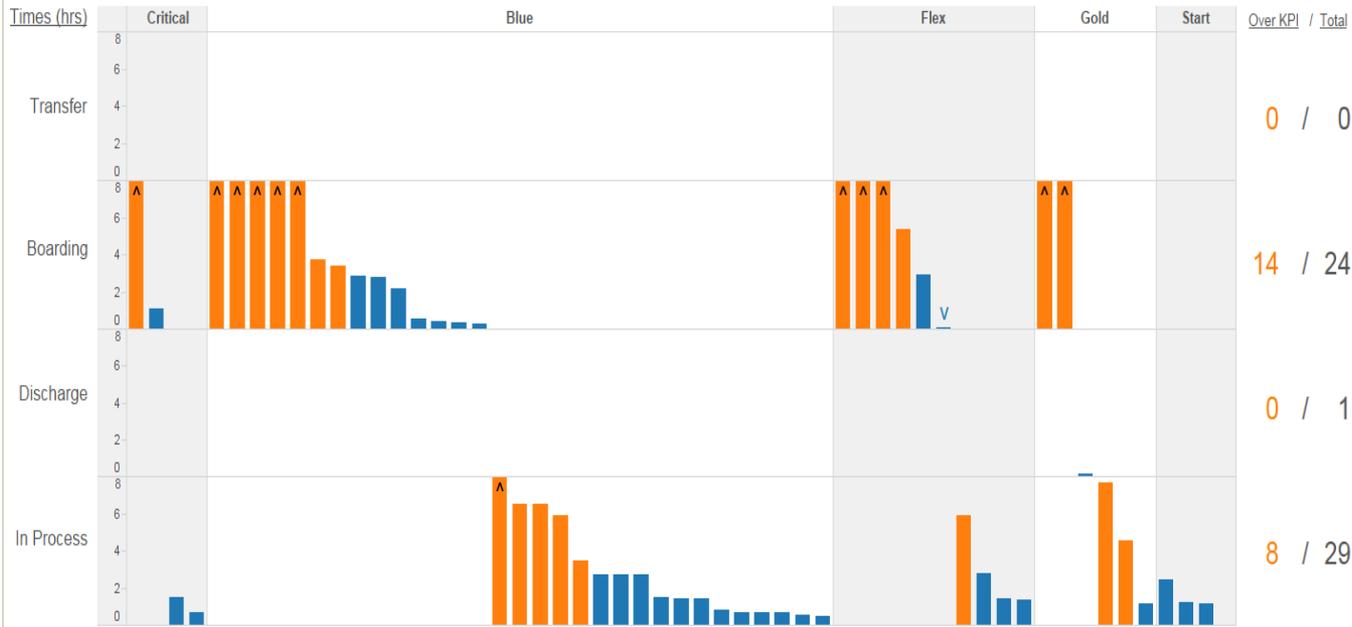
Total In Department:

54

<u>Critical</u> 44%	<u>Blue</u> 134%	<u>Flex</u> 66%	<u>Gold</u> 24%	<u>Start</u> 33%
1 / 4	12 / 31	5 / 10	4 / 6	0 / 4

Care Area Capacity

Over KPI / Total



Now

12/19/2018 11:00:00 PM



ED CENSUS DASHBOARD

As of July 20, 2015 7:35 PM

NEDOCs

160
Severe



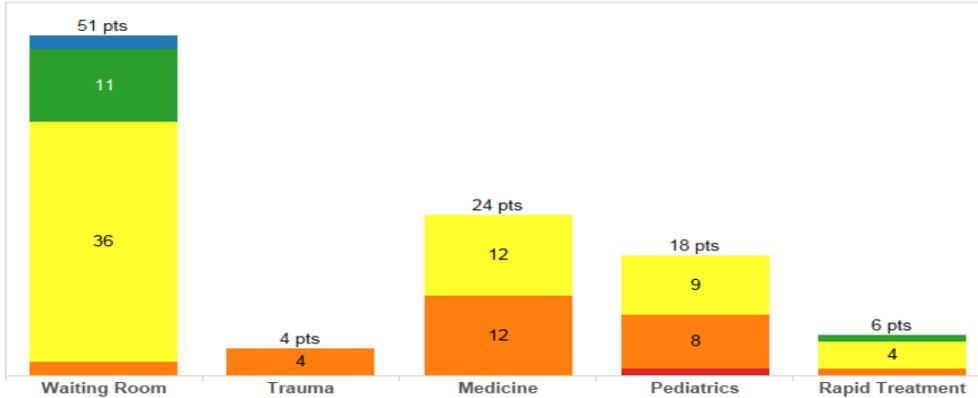
113
Patients Here Now

48
Patients without MSE

52
Patients in a Care Area

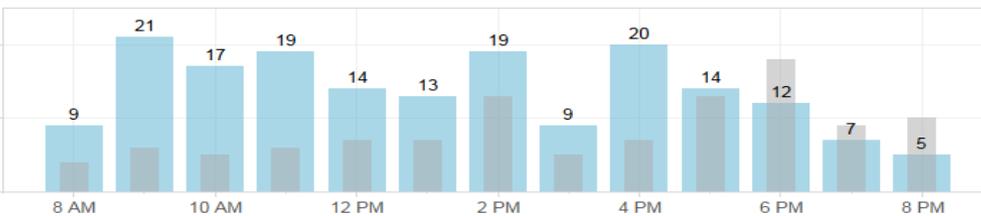
16
Patients with Admit Disposition

CARE AREA CENSUS

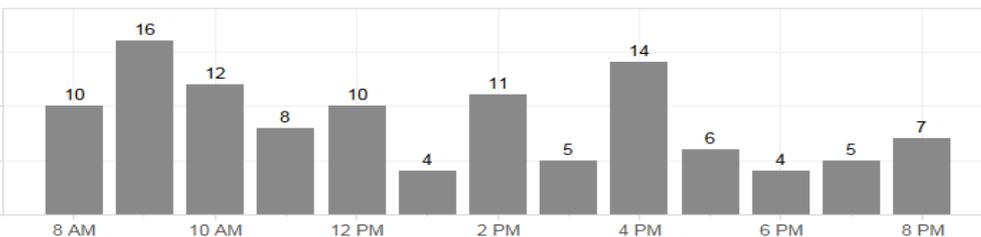


Available Beds	5	3	9	6
----------------	---	---	---	---

ARRIVALS AND DEPARTURES BY HOUR



ROOMED BY HOUR



INPATIENT ADMISSIONS

Room	Count	Minutes
ICU	1	492
Semi-Private	15	361
		279
		220
		194
		191
		165
		164
		109
		91
		73
		67
		53
		47
		14
		0

◆ Patients with Bed Assigned
Count: 5

Filters
Affects all graphs except
Open Inpatient Bed

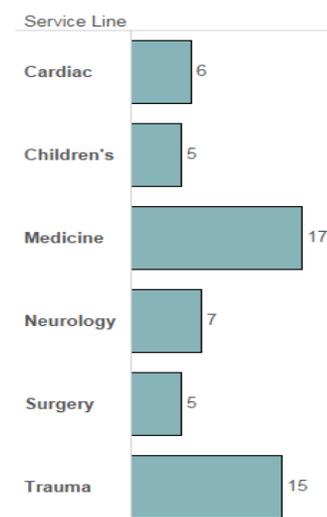
Select Facility

Hospital A ▼

Select Age Group

> 18 years old ▼

OPEN INPATIENT BEDS



Inpatient Bed Filters

Select Service Line

(All) ▼

Select Room Type

(All) ▼

- ESI 5
- ESI 4
- ESI 3
- ESI 2
- ESI 1

- Arrivals
- Departures

ED THROUGHPUT DASHBOARD

As of July 20, 2015 7:35 PM

70
Busy

*

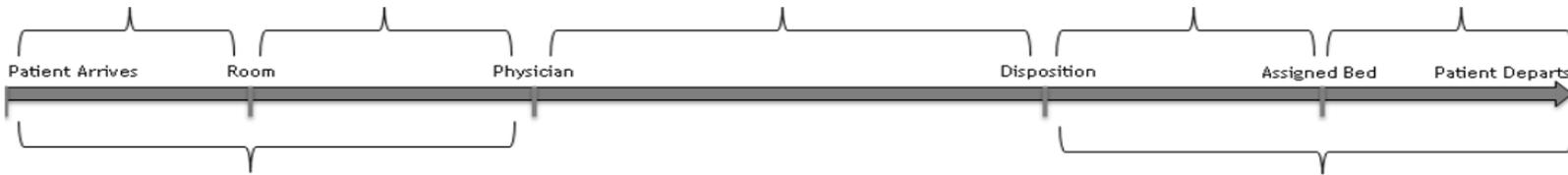
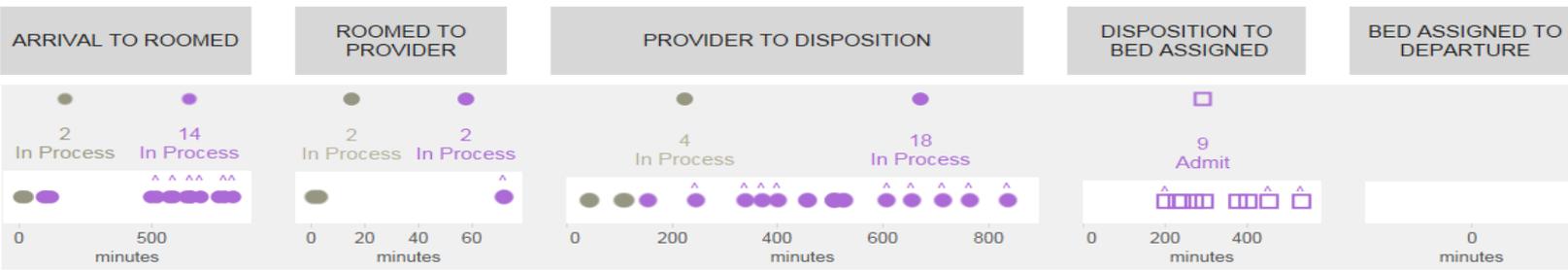
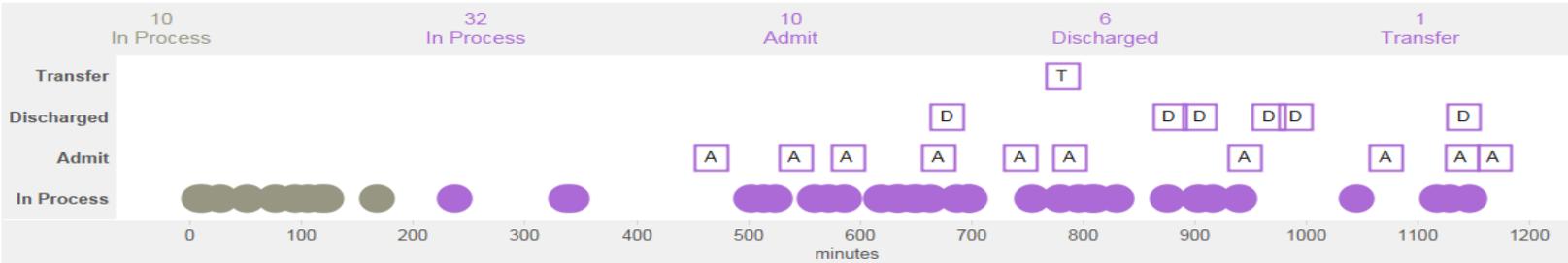
59
Patients Here Now

9
Patients without MSE

43
Patients in a Care Area

10
Patients with Admit Disposition

CURRENT LENGTH OF STAY



Filters

Affect all graphs

Select Facility
Hospital A ▼

Select Care Area
(All) ▼

Select ESI
(All) ▼

Select Age
(All) ▼

Legends

- Over Threshold (Purple circle)
- Below Threshold (Grey circle)
- Dispositioned (Square)
- In Process (Circle)
- ^ indicates patient's overall length of stay is above threshold

NEDOCS DASHBOARD

National Emergency Department Overcrowding Scale

As of July 20, 2015 7:35 PM

NEDOCS

160
Severe



113

Patients Here Now

48

Patients without MSE

52

Patients in a Care Area

16

Patients with Admit Disposition

NEDOCS INTERPRETATION



Filters

Affects all graphs except

Select Facility

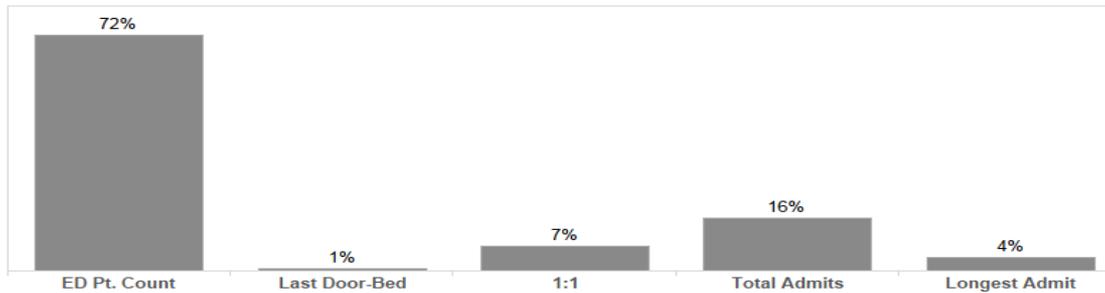
Hospital A ▼

Select Age Group

> 18 years old ▼

NEDOCS COMPONENTS

Total Patients in the ED	Number of Staffed ED Beds	Last Door to Bed Time (min)	Number of 1:1 Patients	Total Admits in the ED	Longest Admit Boarding Time (min)	Number of Inpatient Beds
103	75	2	1	16	492	332



Percent Contribution to NEDOCS Score



Evaluation and Experimentation

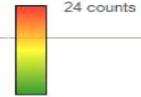
Media: ahrq33211 bottle line.png
Participant filter:

NEDOCs

Severe

166

ED CENSUS DASHBOARD



106

Patients Here Now

14

Patients Needing MSE

49

Patients In Care

18

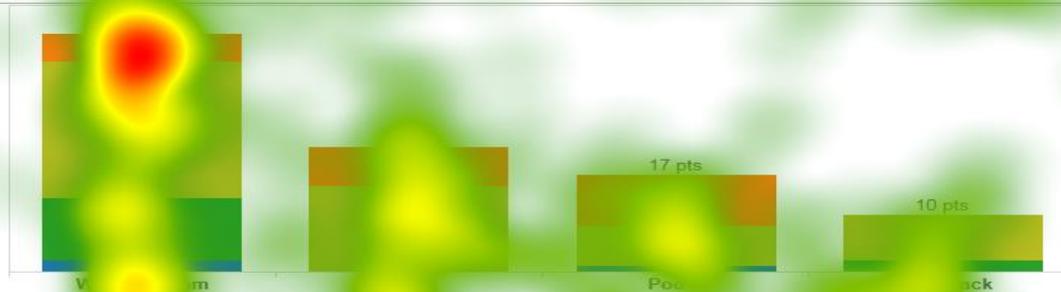
Patients Boarding

1

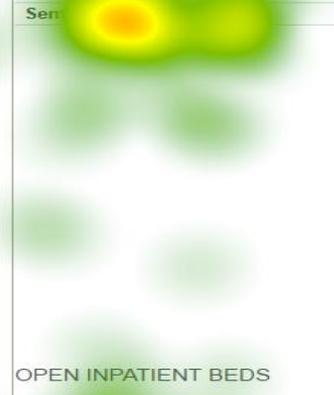
Patients with Bed Assigned

CARE AREA CENSUS

- ESI 2
- ESI 3
- ESI 4
- ESI 5



INPATIENT ADMISSIONS



Hospital Filter

Tracking Group

Age Filter
> 18 years old

Service Line Filter

Unit Filter

Bed Type Filter

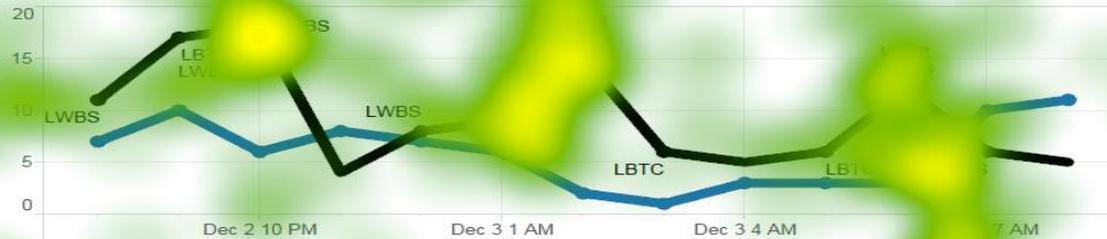
Available Beds

10

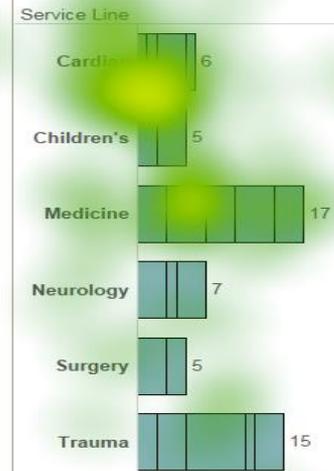
2

ARRIVALS AND DEPARTS BY HOUR

- Arrivals
- Departs



OPEN INPATIENT BEDS



ROOMED BY HOUR



CENSUS DELTA (ARRIVE - DEPART)





Evaluation

- Surveys
- Interviews
- Log data
- Performance data over time



Challenges in Implementation

- Expectation and prior experience
 - ▶ Color scales (The reasons why we use red and green on our slides.)
 - ▶ Displays (But I like bar graphs)
 - ▶ Historical Views (Shifting the focus to real time)



Challenges in Implementation (cont.)

- Integration with workflow
 - ▶ Static versus dynamic displays (Can we have this on a big screen?)
 - ▶ Pocket displays (How about a little one?)



Challenges in Implementation (cont.)

- Trust and Process (We do it by hand.)



Challenges in Implementation (cont.)

- Training
- Culture
- Policy
- Administrative changes



Ongoing Efforts

- Site 3
- Phase 2 of dashboards
- Training of more/different user types
- Observation of systems in use
- Evaluation of impact on systems post adoption phase

ED WORKLOAD DASHBOARD

As of June 23, 2015 6:35 PM

69
Busy

58
Patients Here Now

13
Patients without MSE

48
Patients in a Care Area

6
Patients Boarding

ATTENDINGS



RESOURCES

	Status	Consult	Imaging	Labs	Pharmacy
53624			2 / 2	5 / 5	
53760			0 / 2	2 / 5	
53770			2 / 2	5 / 5	
53771			1 / 1	5 / 5	
67135			1 / 1	5 / 5	
67141		0 / 1	2 / 2	3 / 5	0 / 1

Totals	Consult	Imaging	Labs	Pharmacy
	0 / 1	8 / 10	25 / 30	0 / 1

Resource counts are represented as:
"Number Completed / Total Number Ordered"

Resulted
 Total Ordered

Filters
Affect all graphs

Select Provider Type

Select Care Area

Select Age Group



ED ORDERS DASHBOARD

As of July 20, 2015 7:35 PM

63

Patients Here Now

6

Patients without MSE

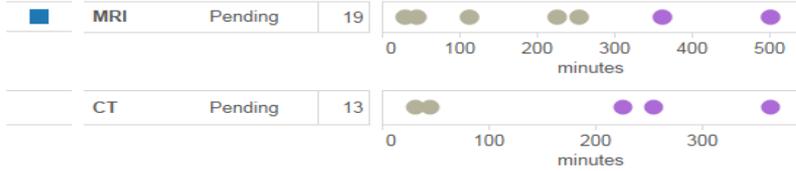
46

Patients in a Care Area

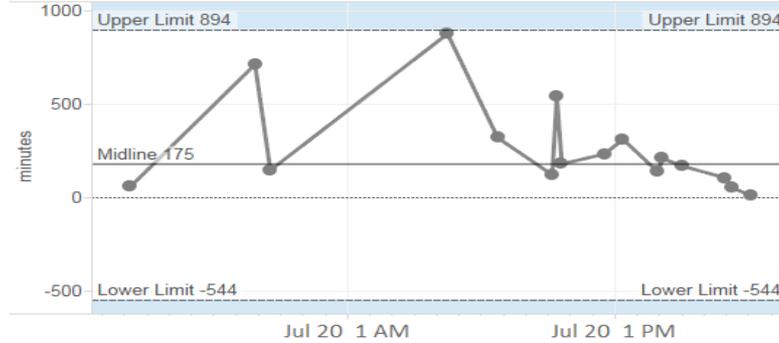
17

Patients Boarding

IMAGING - Currently pending



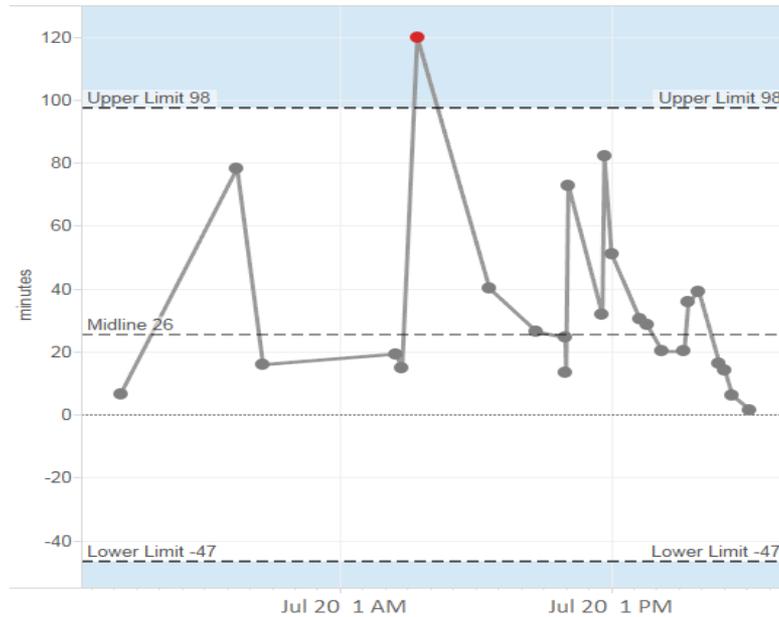
HISTORICAL RECENT RESULTS: MRI



LABORATORY TESTS - Currently pending



HISTORICAL RECENT RESULTS: Hematocrit



Filters

Imaging Selector

MRI

Laboratory Test Selector

Hematocrit

ED PATIENT DASHBOARD

As of December 28, 2015 1:00 AM

Over Goal Under Goal

Gray background indicates current stage of care.

58

Patients Here Now

13

Patients without MSE

48

Patients in a Care Area

6

Patients Boarding

SUMMARY INFORMATION

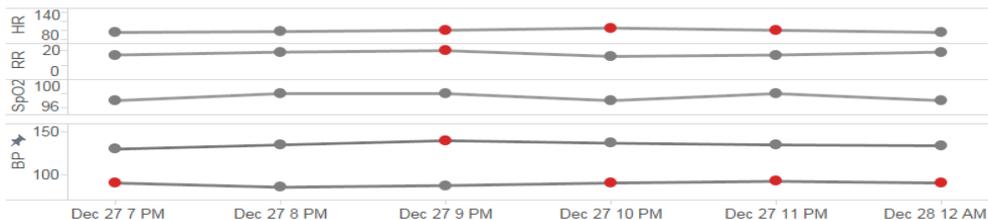
Room #	Acuity	MRN	Last Name	First Name	Age+Gender	Chief Complaint	Allergies:	Alerts:
A POD 57	ESI 3	67135	Smith	Jane	44 F	Chest Pain	Penicillin	Fall Risk

CURRENT VITALS

At 12:00 AM December 28, 2015

HR: 95
RR: 19
SpO2: 97
BP: 134 / 90

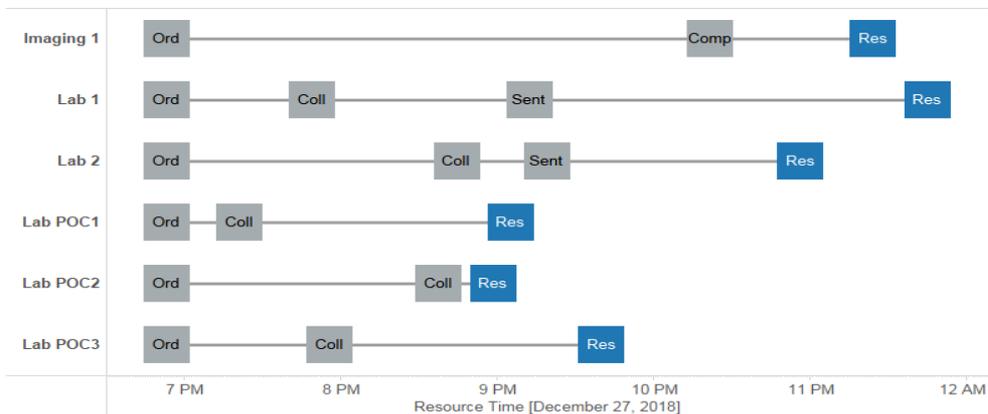
RECENT VITALS



RESOURCE SUMMARY

Consults	
Imaging	1 / 1
Labs	5 / 5
Pharmacy	

RESOURCE STATUS AND TIMELINE



TIME METRICS

Total Length of Stay (min)	Arrival to Provider (min)	Provider to Disposition (min)	Disposition to Depart (min)
1,229	308	649	407

Filters

Affect all graphs

Select Attending

A37

Patient List

Room	MRN	Demo	Chief Complaint
A POD 54	53760	60 M	Abdominal Pain
A POD 57	67135	44 F	Chest Pain
B POD 42	53770	0 M	Diarrhea
	53771	0 F	Cough
B POD 45	53624	35 M	Diarrhea
B POD 49	67141	28 F	Pain

Other Providers for this Patient

Resident	MidLevel	NP	Nurse
R061	Null	Null	N42

Ord: Ordered
Coll: Collected
Sent: Sent
Res: Resulted

Over Goal Under Goal

Gray background indicates current stage of care.

ED THROUGHPUT DASHBOARD

As of June 24, 2015 7:35 PM

NEDOCS

70
Busy



59

Patients Here Now

9

Patients without MSE

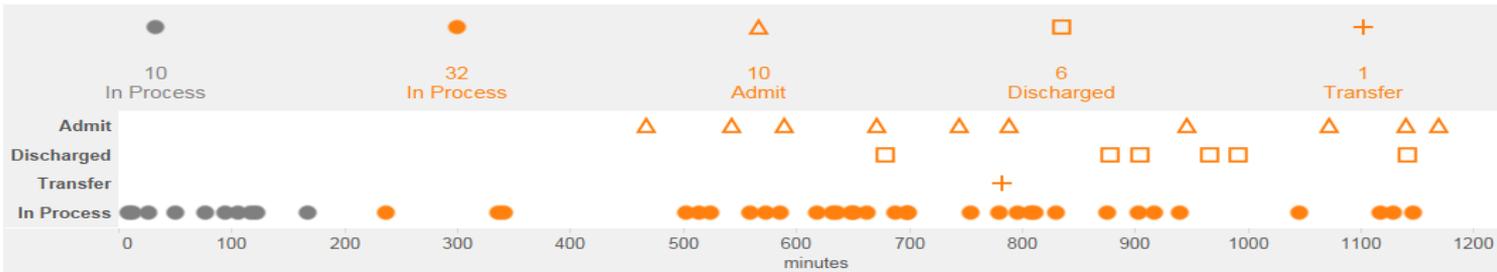
43

Patients in a Care Area

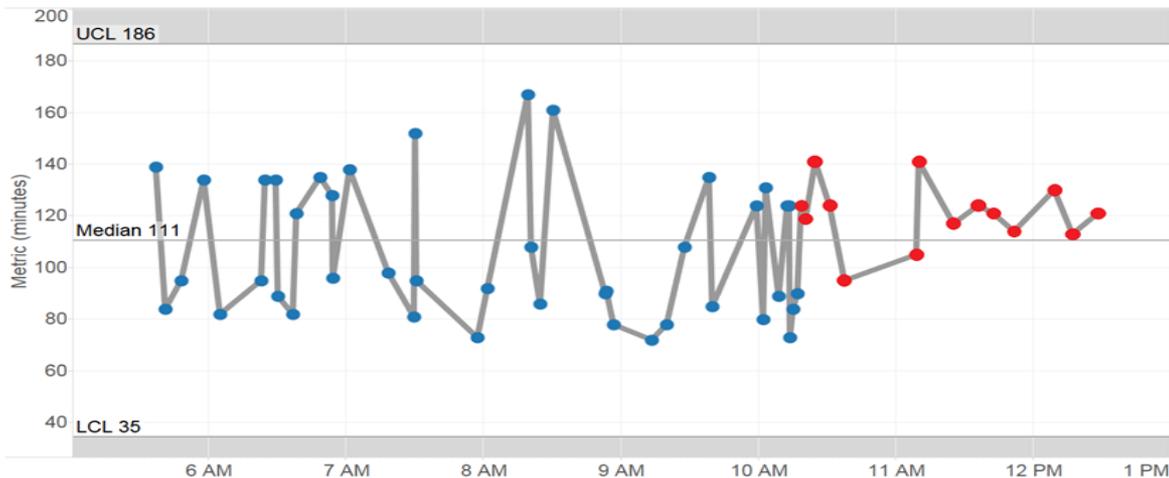
10

Patients with Admit Disposition

CURRENT LENGTH OF STAY



STATISTICAL PROCESS CONTROL CHART



Metric Selector

- Length of Stay
- Arrival to Room
- Room to MSE
- Arrival to MSE
- MSE to Disposition
- Disposition to Bed Assignment
- Bed Assignment to Departure
- Disposition to Departure

Legends

- Over Threshold
- Below Threshold

Filters

Affect all graphs

Select Facility

Hospital A ▼

Select Care Area

(All) ▼

Select ESI

(All) ▼

Select Age

(All) ▼

- Special Cause Variation
- Common Cause Variation



Thank you

- AHRQ
- Our local hospitals and all the wonderful clinicians!

Our Team

- ▶ Juliana Brixey, Ph.D., M.P.H., R.N.
- ▶ Tina Chacko, P.A.
- ▶ Swaroop Gantela, M.D.
- ▶ Todd Johnson, Ph.D.
- ▶ Brent King, M.D.
- ▶ Charles Maddow, M.D.
- ▶ Amit Metha, M.D.
- ▶ Vickie Nguyen, M.S.
- ▶ Nnaemeka Okafor, M.D., M.S.
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Participants Chat ? Q&A

Participants

Speaking:

- ▶ Panelists: 2
- ▶ Attendees:

Q&A

All (0)

Ask: All Panelists

Select a participant in the ask menu first and type your question here. There is a 256 character limit.

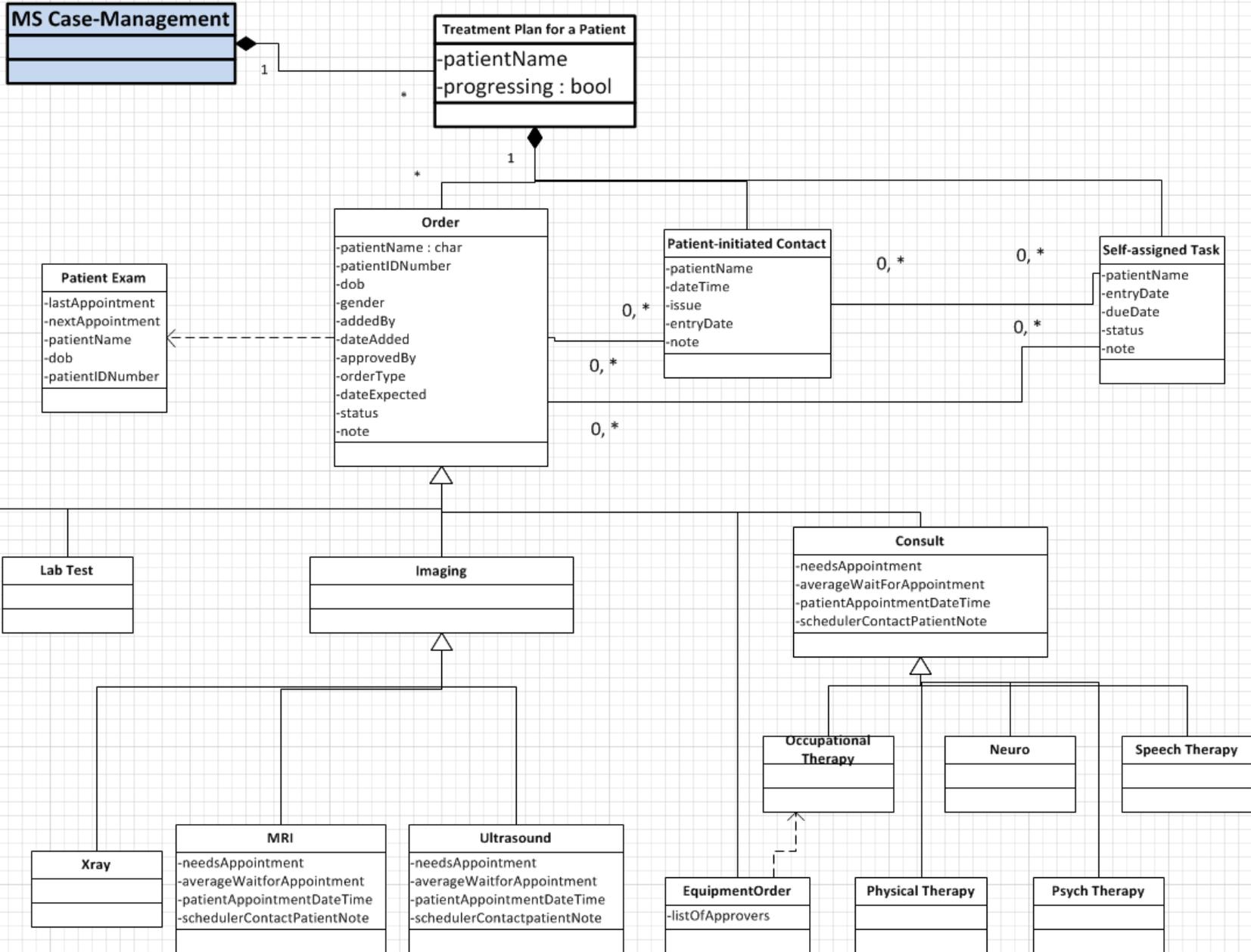
Send

65



Appendix

Conceptual Work Product of Case Management





Intermediate states to check elapsed days to determine acceptable order progress

