

# Analytics in Action

## Applied Clinical Informatics at Mayo Clinic

CPA HIMSS Presents:  
Data Analytics and  
Population Health

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# Conflict of Interest Disclosure

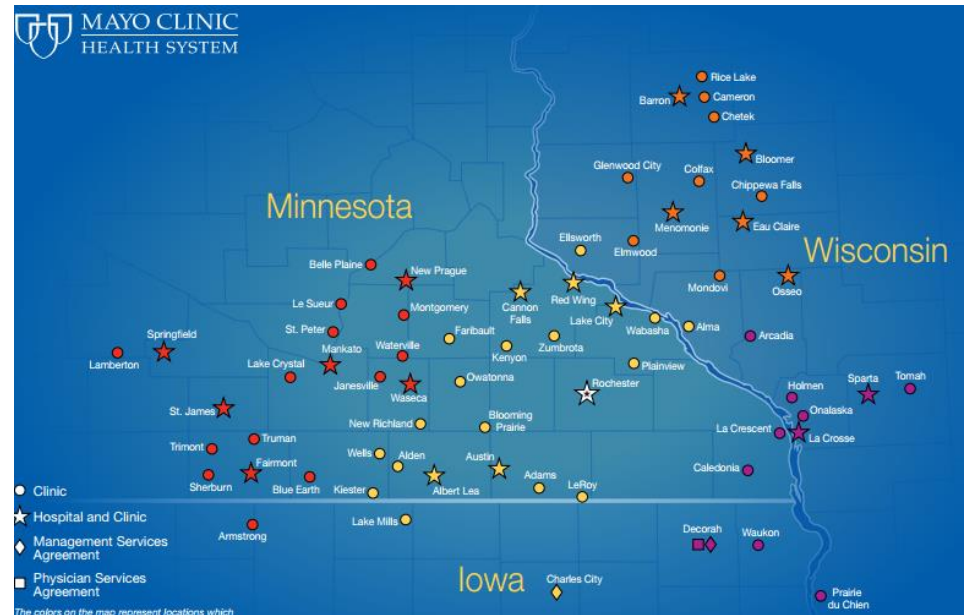
Tim Miksch, MBA

Has no real or apparent conflict of interest to report

# Mayo Clinic

“The best interest of the patient  
is the only interest to be considered.”

*William J. Mayo*



# Mayo Clinic

Total Clinic Patients – 1,318,300\*

Mayo Clinic has a moral responsibility to provide compassionate care to all, and teams of experts deliver seamless, integrated experiences that patients expect.

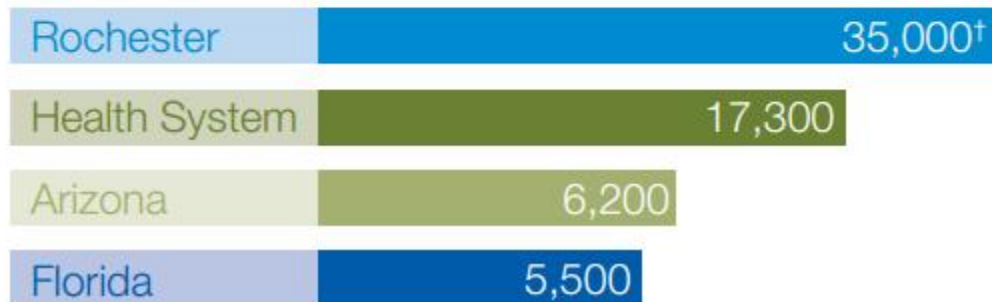


\*Individual patients are counted once annually. Patient numbers are rounded. All figures are from Dec. 31, 2015, unless noted.

<http://www.mayoclinic.org/about-mayo-clinic/facts-statistics>

# Mayo Clinic

Total Clinic Employees – 64,000\*



<http://www.mayoclinic.org/about-mayo-clinic/facts-statistics>

# Personal

- 28+ years at Mayo Clinic
  - 1,200 bed, 60 OR, Catholic Hospital
  - 2,000 Physician Outpatient Practice
  - 100 bed, 50 Physician Community Medical Center
  - 13 site Mayo Clinic Health System
- Human Resources
- Systems & Procedures
- Information Technology
  - Led the implementation of an EHR in MCHS
- BBA, MBA, MS (Biomedical Informatics) in progress

# Mayo Clinic Clinical Systems

## Electronic Environment Current State

- Three distinct EMRs from two vendors
- Hundreds of departmental and specialty Systems
- Common data trust

## Future State

- Project underway to implement a single EMR
- Developing “Data as a Service” concept
- Practice focus is on standardization across the Enterprise

# History of Informatics at Mayo Clinic



## 1907

Dr. Henry Plummer invented the modern dossier record system which quickly replaced the ledger system and became the model for medical records worldwide. Each patient is registered and assigned a clinic number. Each patient also has a special envelope -- filed by clinic number -- in which all patient history is placed. That way, no matter how many visits, a full record is maintained.

<http://www.mayoclinic.org/tradition-heritage/dr-henry-plummer.html>



# 10 years ago.....

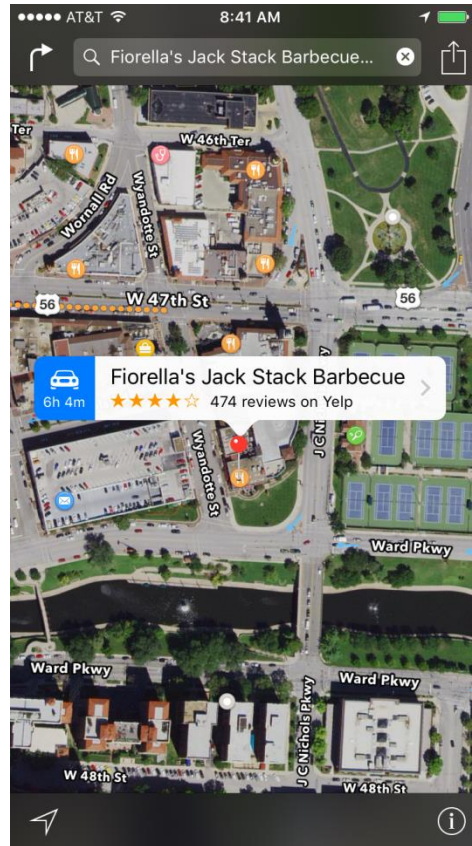
- If someone told you to use a phone to get to Jack's Stack in Kansas City, you'd need:



Alamy

# Now

- “Hey Siri!”



Apps use location data for many purposes, ranging from social networking to turn-by-turn navigation services. They get location data through the classes of the [Core Location framework](#). This framework provides several services that you can use to get and monitor the device's current location:

- The standard location service offers a highly configurable way to get the current location and track changes.

# What's the Connection?

- Wayfinding apps inform the driver of the constantly changing environment, providing guidance along the way
  - Direct and Alternate Routes (with time & distance)
  - Traffic patterns
  - Suggested routes based on preference
  - Even accident and police locations
- They are proactive and adjust on the fly
- They supplement with potentially relevant information
  - Web link to menu, Tap-able phone number for reservations
  - Reviews on best menu items, Suggested alternative venues
- So why can't we (or why don't we) design clinical applications to act in a similar fashion?

# Clinical Decision Support

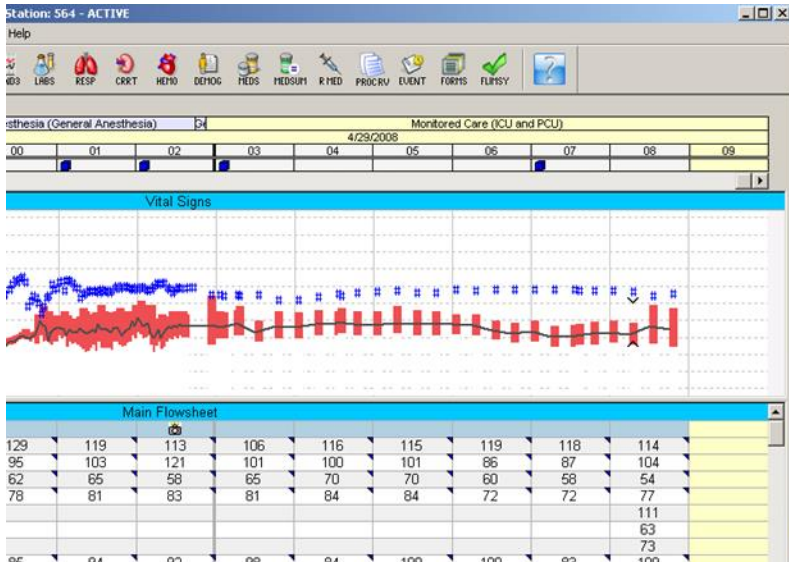
- Frequently interpreted as “rules” to fire after a provider has taken an action, typically an order
- If the system detects a potential problem with the order, such as a drug-drug interaction, an alert window pops up on the screen
- “Alert Fatigue” is a legitimate concern
- Imagine a GPS system that waits until you miss a turn before giving you any feedback... or sends monthly report of all your missed turns
- Or having to bypass 5 useless window alerts when ordering books on Amazon...Every time

# Informatics AND Analytics

- **Clinical informaticians** transform health care by analyzing, designing, implementing, and evaluating information and communication systems that enhance individual and population health outcomes, improve patient care, and strengthen the clinician-patient relationship.<sup>1</sup>
- While a universal definition of clinical data analytics has not yet been established, within the industry, **clinical analytics** refers to the capture and use of discrete clinical data to identify and measure quality, patient safety, or service line efficiencies and improvements<sup>2</sup>

<sup>1</sup> Gardner RM, Overhage JM, Steen EB, Munger BS, Holmes JH, Williamson JJ, et al. Core content for the subspecialty of clinical informatics. J Am Med Inform Assoc. 2009 Mar-Apr;16(2):153-7.

<sup>2</sup> Womack DM, Kennedy R, Bria B. Current Practices in Clinical Analytics: A Hospital Survey Report. NI 2012: Proceedings of the 11th International Congress on Nursing Informatics. 2012;2012:458.



File Patient Session Navigate Help

Study 1: Thromb...

MRN: 6 070 939 | Sex: F | Room Bed: MB56564H | User Number: MR84930

DOB: 14Mar1948 Sun | Age: 60

Active Medication Profile, page 1 of 2

Admission Ht (cm): 177.80 | Admission Wt (kg): 82.00 | Basal Ig (g): 08.10 | 28Apr08

WNO KNOWN MEDICATION ALLE... | 4/24 repair coronary artery fistula, mitral valve repair | 23Apr08

Order	Medication	Generic for	Dose	Range	Units	Route	Frequency	PRN	Start	Stop	Comment	Therapeutic Class
65	Acetaminophen	TYLENOL	650		MG	GT	Every 6 hours ...	PRN	24Apr08 19:03		PRN fe...	ANALGESICS
67	Acetaminophen	TYLENOL	650		MG	PO	Every 6 hours ...	PRN	24Apr08 19:03		PRN fe...	ANALGESICS
51	Acetaminophen	TYLENOL	1000		MG	GT	Every 6 hours ...	PRN	24Apr08 18:03		Unrel pa...	ANALGESICS
50	Acetaminophen	TYLENOL	1000		MG	PO	Every 6 hours ...	PRN	24Apr08 18:03		Unrel pa...	ANALGESICS
156	Albumin human...		500		ML	IV	Once		29Apr08 06:13	00:01		BLOOD AND...
165	Amiodarone +	CORDARON	450		MG	IV	As Directed		29Apr08 08:21		1 mg/m...	Cardio-vascul...
164	Amiodarone +	CORDARON	150		MG	IV	STAT		29Apr08 08:21	00:01		Cardio-vascul...
162	Aspirin		325		MG	PO	Every Day		29Apr08 08:00		TAKE ...	ANALGESICS
125	Bisacodyl	DULCOLAX	10		MG	PO	Every Day	PRN	24Apr08 19:03		Do not ...	ANALGESICS
142	Cefazolin	ANCEF/KE	1		GM	IV	Floorstock		29Apr08 01:18	00:01		ANTIBIOTICS
160	Cefepime +	MAXIPIME	1000		MG	IV	Every 12 hours		29Apr08 08:00			ANTIBIOTICS
158	Ethinylphine +	ADRENALIN	4		MG	IV	As Directed		29Apr08 04:04			ADRENERGI...
157	Esmolol +		2500		MG	IV	Floorstock		29Apr08 08:21	00:01	0.02 m...	ADRENERGI...
98	Ezopiclone	LUNESTA	2		MG	PO	Every bedtime		27Apr08 22:00		25 mcg...	PSYCHOAC...
159	Famotidine +	PEPCID	20		MG	IV	Two times a day		29Apr08 08:00	30Apr08 20:00		PSYCHOAC...
149	Fentanyl	SUBLIMAZE	25		MCG	IV	As Needed	PRN	29Apr08 03:08		0.15 m...	ANALGESICS
132	Fentanyl	SUBLIMAZE	100		MCG	INJEC.	Floorstock		29Apr08 02:47	00:01		ANALGESICS
147	Fentanyl		1	1500	MCG	PCA IV	Every 4 Hours		29Apr08 03:00		0.25 m...	ANALGESICS
148	Fentanyl											
146	Furosemide	LASTIX										
61	Heparin											
155	Insulin regulat...											

# Overwhelming amount of patient-specific Data

Images

Vent rate: 66 | PR interval: 188 | QRS duration: 90 | QT/QTc: 402/431 | P-R-T axes: 31 45

Technician ID: 584 | Floor: G005S | Referred by: 47520 | Confirmed By: TITUS EVANS J

Test	Result	Reference	Date	Time
Potassium, B...	3.6-5.2 mmol/L	2.8 * @a1	29 Apr 08	
Potassium, B...	3.6-5.2 mmol/L	6.0 * @	29 Apr 08	
Glucose (P)...	70-100 mg/dL	222 * @a1	29 Apr 08	
Glucose, P...	70-100 mg/dL	287 *	29 Apr 08	
POC Glucose, B...	70-100 mg/dL	158 *	28 Apr 08	
Hematocrit, B...	34.9-44.5 %	27 *	28 Apr 08	
BLOOD CHEMIST...				
Creatinine...	0.6-1.1 mg/dL	0.6	28 Apr 08	
Creatinine, P...	0.6-1.1 mg/dL	0.9 @a1	29 Apr 08	
eGFR-Non African ...	>60	>60 @a3	29 Apr 08	
eGFR-African Ame...	>60	>60 @a3	29 Apr 08	
BUN (Bld Urea Ntr...	6-21 mg/dL	9	28 Apr 08	
BUN...	6-21 mg/dL	14 @a1	29 Apr 08	
Chloride...	100-108 mmol/L	98 *	28 Apr 08	
Chloride, B...	100-108 mmol/L	104 @a1	29 Apr 08	
Bicarbonate, P/S...	22-29 mmol/L	30 *	28 Apr 08	
Bicarbonate, P...	22-29 mmol/L	31 * @a1	29 Apr 08	
Anion Gap...	7-15	7	28 Apr 08	
Calcium, Ionized (B)...	4.65-5.30 mg/dL	4.0 * @a1	29 Apr 08	
Calcium, Ionized, B...	4.65-5.30 mg/dL	5.0	28 Apr 08	
pH...	7.35-7.45	7.41	28 Apr 08	
LIPIDS 63 AG				
LIPIDS 1 AG				

Most recent

Test	Result	Date	Time
MCR	29 Apr 08	4:37	
MCR	29 Apr 08	3:26	
	28 Apr 08		
	29 Apr 08		
	29 Apr 08	149 *	
	28 Apr 08		
	28 Apr 08		
	29 Apr 08		

Start | My Computer | ORDERS: N... | 6 070 939 C... | Documents... | Inbox - Micr... | Quarterly... | Clinical Flow... | MICS Chart... | Remote W... | QREADS... | Control Panel | Mayo Echo L... | CN: 60709... | 09:00

## See-Think-Act

- Present the information they need in a meaningful way
- Avoid the information they don't need
- Make it easy to take the next best step
  
- Some examples of how Mayo is attempting this follow...

# Inpatient surgical practice



# The CRS Plan

	Goal	Presurgical visit	Preoperative: day of surgery	Intraoperative	PACU	Postoperative day 0 (day of surgery)	Postoperative day 1 - dismissal (order set)	Dismissal
<b>Pain management</b>	Pain score <4 or patient pain goal	Patient Education	Celecoxib (oral) Gabapentin (oral) Acetaminophen (oral) Adjustments for renal failure, age	Single-injection intrathecal	Maximize multimodal pain management	Acetaminophen NSAIDS Adjustments for hepatic, renal disease respectively	Oxycodone for pain score >4 (rare needs) Maximize non-pharmacologic	-
<b>Diet</b>	General diet within 4 hours of surgery end time	-	Nothing by mouth 6 hours prior	-	Start liquids	General diet Adjustment to diabetic for diabetic patients	General diet Adjustment to diabetic for diabetic patients	-
<b>Fluids</b>	Euolemia	-	Oral clears up until 2 hours prior	Euolemia goals	IV fluid rate to 40mL/hr	Oral intake at least 800 not to exceed 2000	IV fluids stop at 8 AM day after surgery	-
<b>Activity</b>	Rapid return to baseline	-	Baseline (continued normal daily activities)	-	-	Up in chair for meals Out of bed >2 hours, 1 or more walks	Up in chair for meals Out of bed >8 hours, 6 or more walks	-
<b>Dismissal planning</b>	Anticipate a 2-3 day stay. Many patients will be eligible to leave the hospital day 2.	Ensure dismissal plan in place	Ensure dismissal plan in place and patient has transportation following procedure	-	-	-	-	Follow dismissal instructions

It was difficult to ensure everyone on the care team not only knew the plan, but where the patient was **in relation to the plan.**

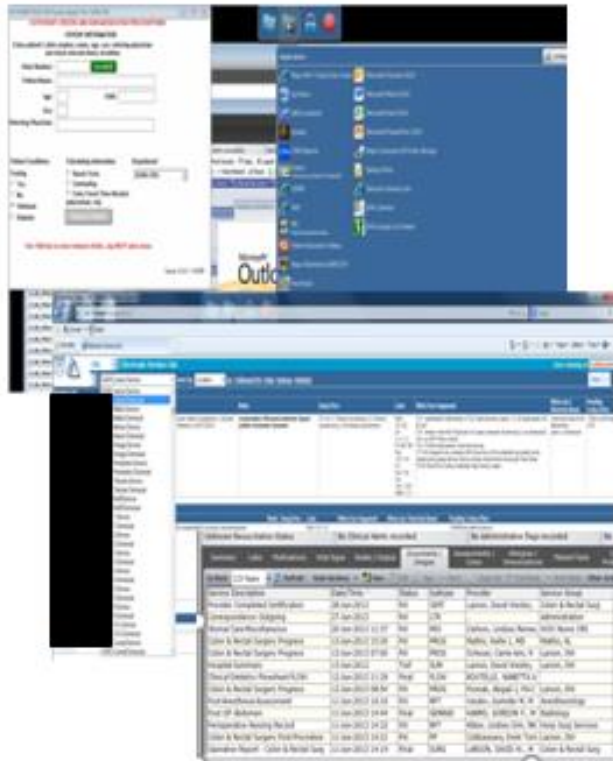
# Analytics Can Directly Influence Behavior ("You manage what you measure")

	Count of Mayo Clinic Number	Average of Procedure LOS	Average of Surgical Op Time	Count of Pain Score Return to Room	% Pts w/Pain Score
<b>CTRS</b>	<b>6,758</b>	<b>5.92</b>	<b>314.91</b>	<b>6,656</b>	<b>98.5%</b>
B. G.	337	4.82	155.19	335	99.4%
D. W.	905	4.91	252.02	890	98.3%
E. J.	714	6.58	228.55	699	97.9%
H. K.	931	5.40	207.17	919	98.7%
H. N.	283	5.79	261.26	283	100.0%
J. H.	715	7.17	172.83	706	98.7%
K. L.	470	6.07	173.89	452	96.2%
R. M.	1,028	5.43	378.81	1,025	99.7%
R. R.	1,229	6.59	649.03	1,203	97.9%
S. Y.	146	6.23	172.38	144	98.6%

Averaged 62% prior to data transparency

# Point of Care (PoC) Tools

## Current State of Electronic Environment

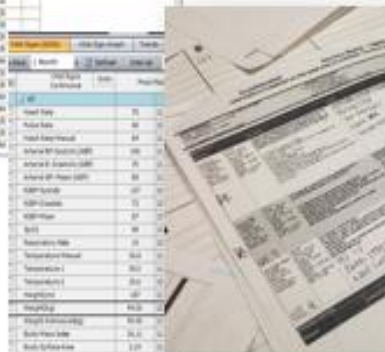


- Numerous Apps (20+ user)

- Users: "Hunting & Gathering"
- Not Optimized to Workflow
- No Pathway Monitoring
- Still use Paper Intermediates



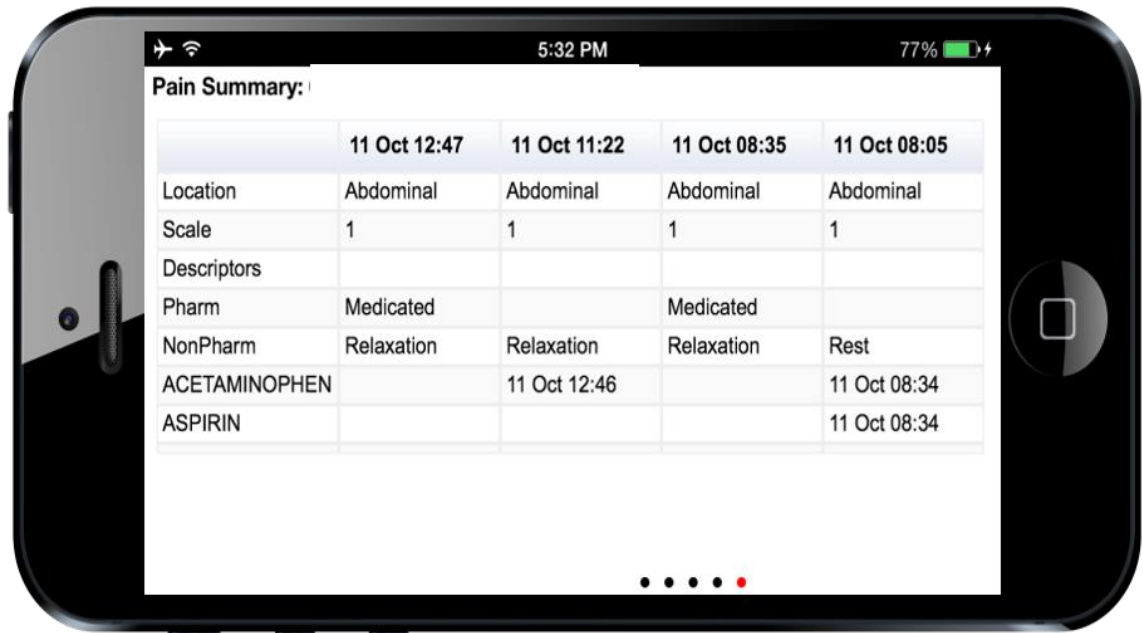
Category	Item	Start Date	End Date	Frequency	Priority	Status
Medication	Aspirin	10/10/12	10/10/12	1	High	Completed
	Warfarin	10/10/12	10/10/12	1	High	Completed
	Insulin	10/10/12	10/10/12	1	High	Completed
	Antibiotics	10/10/12	10/10/12	1	High	Completed
Lab Tests	Complete Blood Count	10/10/12	10/10/12	1	High	Completed
	Prothrombin Time	10/10/12	10/10/12	1	High	Completed



- Lots of Clicking
- Frequent switching between Apps

# Presentation

- What opportunities are there to create “views” for specific needs?
- A LOT!



The image shows a tablet displaying a 'Pain Summary' table. The table has four columns representing different dates: 11 Oct 12:47, 11 Oct 11:22, 11 Oct 08:35, and 11 Oct 08:05. The rows represent various attributes of the pain: Location, Scale, Descriptors, Pharm, NonPharm, ACETAMINOPHEN, and ASPIRIN. The data is as follows:

	11 Oct 12:47	11 Oct 11:22	11 Oct 08:35	11 Oct 08:05
Location	Abdominal	Abdominal	Abdominal	Abdominal
Scale	1	1	1	1
Descriptors				
Pharm	Medicated		Medicated	
NonPharm	Relaxation	Relaxation	Relaxation	Rest
ACETAMINOPHEN		11 Oct 12:46		11 Oct 08:34
ASPIRIN				11 Oct 08:34



13 g/dl



9 g/dl

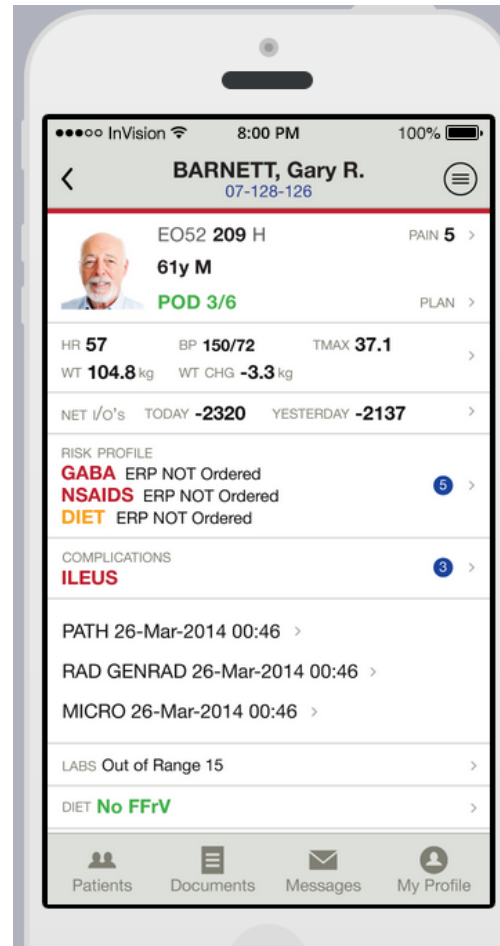
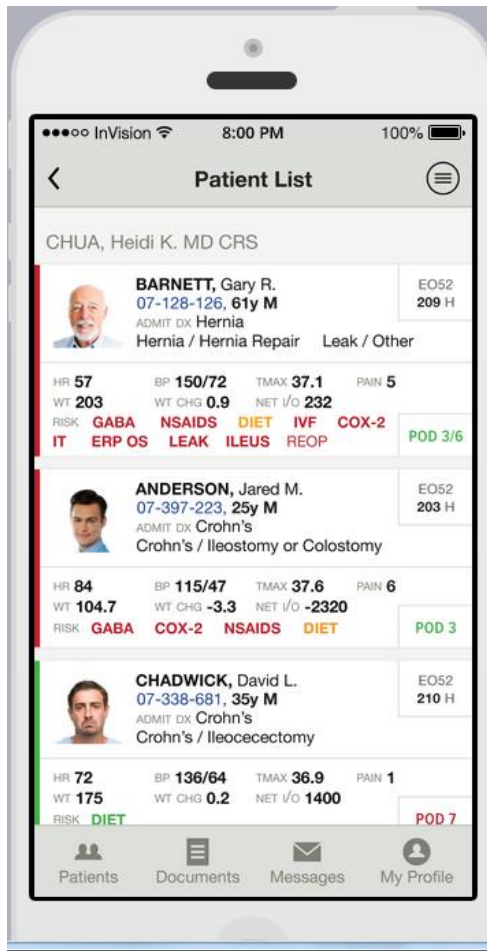


A drop of more than 3!

# Enriching the data through Real Time analytics



# Point of Care Tool Prototypes



# Current Electronic Environment vs. New CRS Tool

## Eliminating waste, Improving Quality

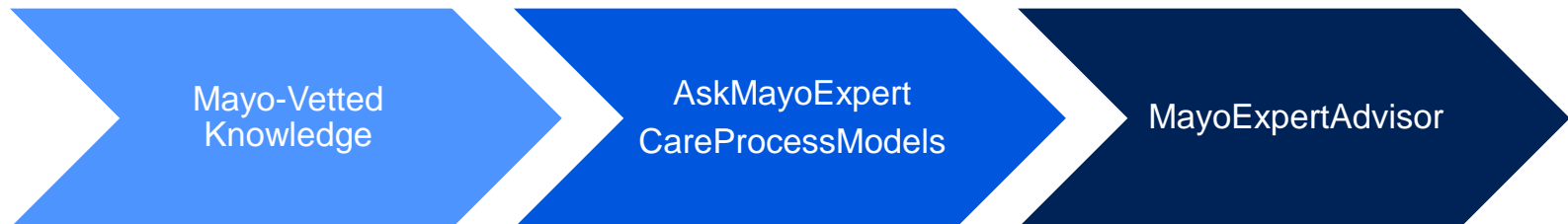
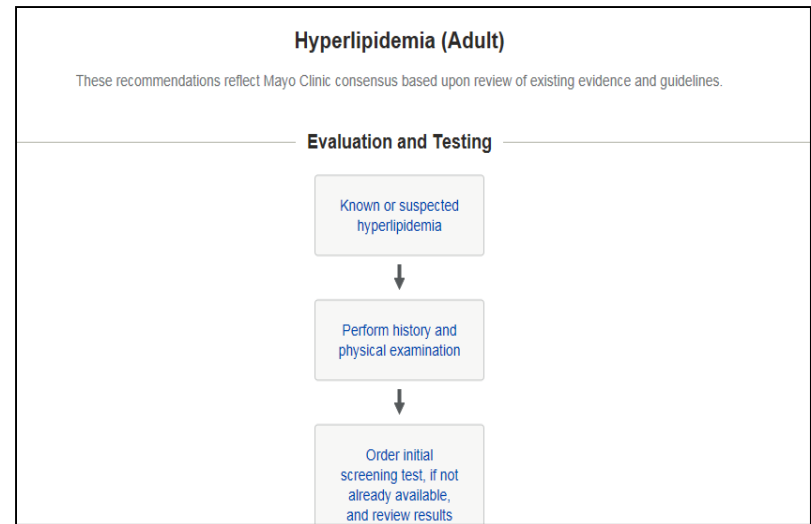
Provider Workflow/Effort	Current EMR Needs to Round	New PoC Tool (mobile) Needs to Round
Information Systems	11+	1
Use of Paper Intermediates	5+	0
Manual Pathway/ Complication Calculations	>36	<b>0</b>
Screen Transitions (Inter-application)	237 (43)	<b>25 (0)</b>
Mouse Clicks	619	<b>25</b>
Estimated Cognitive Load Index	1,623	<b>75 (&lt;5% of current)</b>
Time (minutes)	30:14 (95% on navigation)	<b>&lt; 4:30 (95% on Clinical)</b>

# Primary care



# AskMayoExpert: Care Process Models (CPMs)

- CPMs are interactive algorithms that illustrate evidence and expert opinion-based core knowledge about a disease or condition, and represent the consensus of colleagues from all sites



- MayoExpertAdvisor translates care process models into computable code to better deliver knowledge to care givers.

# Current Process for Providers



## Statin Choice Decision Aid

### Current Risk

Select Risk Calculator

ACC/AHA ASCVD

Framingham

Reynolds

Do you have a history of events such as prior heart attack or stroke, acute coronary syndromes, history of angioplasty or stents, etc?

Yes No

These figures are used to calculate my risk of having a heart attack in the next 10 years:

Age 40 - 75

Gender M F

Population Group

Smoker Yes No

Diabetes Yes No

Treated SBP Yes No

Conv. Unit

SI Unit

Systolic Blood Pressure 90 - 250 mmHg

HDL Cholesterol 10 - 120 mg/dL

Total Cholesterol 100 - 350 mg/dL

Select Current Intervention

Statins  No  Std Dose  High Dose

### Statin Patient Decision Aid:

1. Provider has to locate the statin decision aid within AME
2. After clicking on link, directed to the statin decision aid
3. The provider has to manually enter the patient's vitals, lab values, and history

# Clinical Viewer Screen

The screenshot displays the Mayo Clinic Clinical Viewer interface for patient **TESTING, Ann**. The interface includes a navigation pane on the left with sections like **Patient Records**, **Clinical InBox**, **Provider Appointments**, **Document and Order Manager**, **Toolbox**, and **Reports**. The main content area shows patient details such as **Age: 57y**, **Gender: F**, and **Born:**. A **Clinical Alert(s): MEA Recommendation (2)** notification is highlighted with a red box. The **APPT Today** section lists two appointments, with the second one for **TESTING, Ann MEA (2)** highlighted. The **Allergies** and **Labs** sections are also visible, with the **Labs** section displaying **No lab results found.**

\*Notifications only show for actionable recommendations

**A. Care Recommendation**

Depending on the individual patient's data in the EHR, MEA makes a recommendation.

**B. Vitals**

Most recent outpatient vitals.

**C. Relevant Patient Data**

The most relevant demographics, conditions, medications and labs for managing the given condition.

**D. Resources for Next Steps**

Additional condition-specific tools (e.g. titration schedules) to assist in recommendations.

**E. Risk Calculators**

Condition-specific risk calculators with patient's data prefilled for real-time calculations.

**F. Decision Aids**

Mayo-vetted shared decision making tools. Field values are prefilled with patient data.

**G. Patient Education**

Links to relevant patient education material in AME.

Testing, Ann

Blood Pressure  
145/85 mm/Hg 08-Aug-2016

Heart Rate  
58.0 bpm 08-Aug-2016

Weight  
95.0 kg 08-Aug-2016

BMI  
38.1 08-Aug-2016

Primary Physician  
John, Provider

Refresh data

Feedback

Please help improve this product by providing feedback.

Conditions

Hyperlipidemia

Care Recommendation:  
Consider moderate- to high-intensity statin therapy due to LDL  $\geq$ 190

Relevant Patient Data

Demographics  
Adult

Conditions/Problems  
Hyperlipidemia

Lab Results  
Total cholesterol  
289 mg/dL 13-Nov-2014  
HDL  
73 mg/dL 13-Nov-2014  
LDL  
200 mg/dL 13-Nov-2014  
Non HDL Cholesterol  
217 mg/dL 13-Nov-2014

Resources for Next Steps

Moderate- to high-intensity statin dosing and surveillance recommendations

10 Year Risk of Major Cardiac Event (ACC ASCVD): 3.4%

View tool

30 Year Risk of Major Cardiac Event: 25%

View tool

Decision Aids

\*\* Statin Decision Aid \*\*

Ask Mayo Expert

Hyperlipidemia

Patient Education

Hyperlipidemia

Hide details and knowledge resources

## Hyperlipidemia



Care Recommendation:

Consider moderate- to high-intensity statin therapy due to ASCVD

### Relevant Patient Data

#### Demographics

Adult

#### Conditions/Problems

ASCVD

Hyperlipidemia

Diabetic

Hypertension

#### Lab Results

Total cholesterol

HDL

LDL

Non HDL Cholesterol

### Resources for Next Steps



Moderate- to high-intensity statin dosing and surveillance recommendations



10 Year Risk of Major Cardiac Event (ACC ASCVD): 65.1%

[View tool](#)

#### Decision Aids

**\*\* Statin Decision Aid \*\***

#### Ask Mayo Expert

[Hyperlipidemia](#)

[Screening Recommendations for Asymptomatic Men](#)

#### Patient Education

[Lowering High Triglycerides Through Diet](#)

[Managing Cholesterol, Sodium and Triglycerides](#)

[Alternative Therapies for Managing or Lowering Cholesterol](#)

[Your Cardiovascular Health Risk Assessment](#)

[Mayo Clinic Healthy Weight Pyramid](#)

[CV - Cardiovascular Risk Reduction Program](#)

[Blood Pressure and Weight Record](#)

## 10 Year Risk of Major Cardiac Event (ACC ASCVD)



### Patient Data

Pre-filled values are pulled from the patient record. Adjusting the values will not affect the patient's record.

Age:  (40-79)

Sex:  Female  Male

Race:  ▼

Total Cholesterol (mg/dL):  (130-320)

Hdl - Cholesterol (mg/dL):  (20-100)

Systolic Blood Pressure:  (90-200)

Diabetes:  Yes  No

Hypertension:  Yes  No

Smoker:  Yes  No

### Risk Score

**11.2%**

Original score based on current data from the patient record.

**26.8%**

Based on adjusted patient data values.



Adjust the values and click recalculate to model interventions. Adjusting the values will not effect the patient's record.

**Recalculate**

Reset to patient record values

## Congestive Heart Failure with Reduced Ejection Fraction



Care Recommendation:

Consider increasing dose of Losartan to target dose for heart failure, monitor creatinine and potassium levels

### Relevant Patient Data

#### Demographics

Adult

#### Conditions/Problems

CHF

Diabetic

Hypertension

#### Lab Results

Creatinine

**0.8 mg/dL** 18-Jan-2016

Potassium

**4.3 mmol/L** 18-Jan-2016

Ejection Fraction

**0.49** 20-May-2014

### Resources for Next Steps

[→ ARB titration schedule](#)

[📅 Seattle Heart Failure 2 Year Survival:](#) [View tool](#)

#### Decision Aids

[\\*\\* Statin Decision Aid \\*\\*](#)

#### Ask Mayo Expert

[Heart Failure Reduced Ejection Fraction \(HFrEF\)](#)

[Screening Recommendations for Asymptomatic Women](#)

#### Patient Education

[Heart Failure Self-Care Plan](#)

[Circulation of the Heart](#)

[Mediterranean Diet](#)

[CV - Cardiovascular Risk Reduction Program](#)

[Blood Pressure and Weight Record](#)

[Mayo Clinic Healthy Weight Pyramid](#)

## Heart Failure Survival (Seattle Heart Failure Model) ✕

### Patient Data

Pre-filled values are pulled from the patient record. Adjusting the values will not affect the patient's record.

Clinical	Lab Data	Diuretics (Total Daily Dose)	IV	Medications	Devices
Age: <input type="text" value="87.83"/>	Hgb (g/dL): <input type="text" value="11.3"/>	Furosemide (mg): <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/> ACE-I	<input type="radio"/> None
Sex: <input type="text" value="Male"/>	Lymphocyte %: <input type="text" value="22"/>	Bumetanide (mg): <input type="text"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Beta-blocker	<input checked="" type="radio"/> BIV Pacer
NYHA Class: <input type="text" value="2"/>	Uric Acid (mg/dL): <input type="text" value="5.8"/>	Torsemide (mg): <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/> ARB	<input type="radio"/> ICD
Weight (kg): <input type="text" value="90.4"/>	Total Chol (mg/dL): <input type="text" value="166"/>	Metolazone (mg): <input type="text"/>		<input checked="" type="checkbox"/> Statin	<input type="radio"/> BIV ICD
EF%: <input type="text" value="30"/>	Sodium (mmol/L): <input type="text" value="145"/>	HCTZ (mg): <input type="text"/>		<input checked="" type="checkbox"/> Allopurinol	<input type="radio"/> LVAD
Syst BP: <input type="text" value="108"/>	<input type="checkbox"/> LBBB	Chlorothiazide (mg): <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/> Aldo blocker	Some devices may be disabled if clinical criteria are not met.
<input type="checkbox"/> Ischemic	<input type="checkbox"/> QRS > 150 msec	<b>Other Support</b>			
		<input type="checkbox"/> IABP/Vent/UF	Pressors/Inotropes <input type="text" value="0"/>		

### Survival Rate      1 year      2 year      5 year      Mean Life Expectancy

Baseline	90%	81%	55%	6.4 years
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**Recalculate**

[Reset to values from patient record](#)



Adjust the values and click recalculate to model interventions. Adjusting the values will not effect the patient's record.

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## Atrial Fibrillation



Care Recommendation:

Consider anticoagulation therapy, if HAS-BLED score <3, due to CHA2DS2-VASc score 2 or greater

### Relevant Patient Data

#### Demographics

Adult

#### Conditions/Problems

Atrial fibrillation

Diabetic

Hypertension

### Resources for Next Steps



Review HAS-BLED bleeding risk score, consider anticoagulant



CHADS2-VASc Score: 6 points

[View tool](#)

#### Ask Mayo Expert

[Heart Failure With Reduced Ejection Fraction \(HFrEF\)](#)

#### Patient Education

[Mediterranean Diet](#)

[Lowering High Cholesterol](#)

[Hide details and knowledge resources](#) ^

## CHA2DS2VASc Risk Score



The CHA2DS2VASc score is a clinical prediction tool for estimating stroke risk in patients with non-rheumatic atrial fibrillation and to identify candidates for anticoagulation or antiplatelet therapy.

### Patient Data

Pre-filled values are pulled from the patient record. Adjusting the values will not affect the patient's record.

Age:  <65  65-74  ≥75

Sex:  Female  Male

Congestive Heart Failure History:  Yes  No

Hypertension History:  Yes  No

Stroke/TIA/Thromboembolism History:  Yes  No

Vascular Disease History:  Yes  No

Diabetes:  Yes  No

### Risk Score

**6 points**

Original score based on current data from the patient record.

A score of 0 is "low" risk and may not require anticoagulation; a 1 score is "low-moderate" risk and should consider antiplatelet or anticoagulation, and score 2 or greater is "moderate-high" risk and should otherwise be an anticoagulation candidate.



Adjust the values and click recalculate to model interventions. Adjusting the values will not effect the patient's record.

Recalculate

[Reset to patient record values](#)

# Sample Results

Metric	Without MEA	With MEA	Percent Improvement
Click Count	284	84	338 %
Elapsed Time to Calculate	9:02	1:34	673 %
Keystrokes	73	28	260 %
Page Changes	15	4	375 %

	# of Individuals	Percent
Very likely to recommend	6	42.9%
Somewhat likely to recommend	7	50.0%
Neither likely nor unlikely to recommend	1	7.1%
Somewhat unlikely to recommend	0	0.0%
Very unlikely to recommend	0	0.0%
Total	14	100.0%

Thank you

Questions?