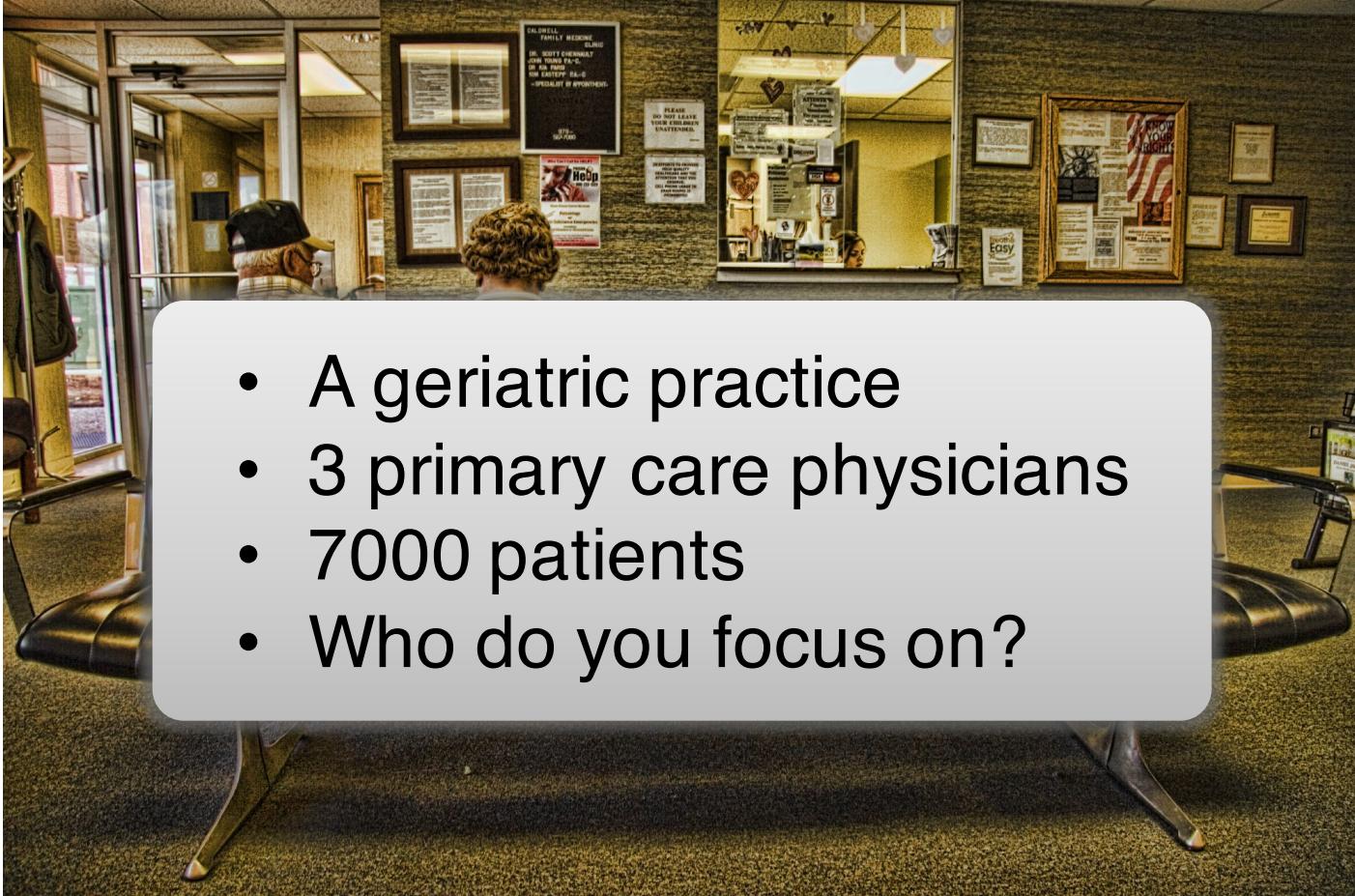




Data-Driven Team Huddles

MITRE



[Trip To The Doctor's Office #1--The Waiting Room](#) by Carol Von Canon ([Creative Commons Attribution-NonCommercial-NoDerivs 2.0 Generic](#))

An Approach: Team Care and Huddles

- Interdisciplinary teams
- Frequent communication
- Holistic view of patients
- Used in other domains



An Approach: Team Care and Huddles

- Team huddles are proving effective
 - 21% decreases in provider communication time to resolve issues ¹
 - Key trait of highly functioning primary care practices ²

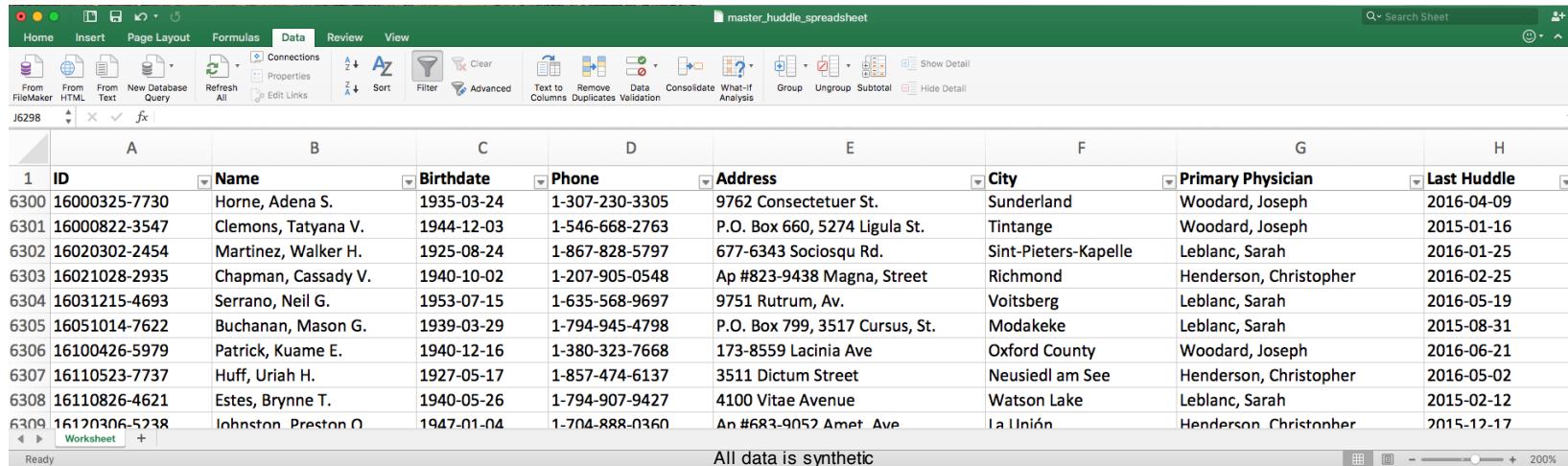
Recommended by:



Institute for
Healthcare
Improvement

The Challenge of Team Huddles

- Huddle preparation is often a manual, time-intensive task
- Huddles may still miss important opportunities
 - Who needs attention but is not discussed?
 - What information or risks are pertinent, but not realized?



The screenshot shows a Microsoft Excel spreadsheet with the title bar 'master_huddle_spreadsheet'. The ribbon menu includes Home, Insert, Page Layout, Formulas, Data, Review, and View. The Data tab is selected, showing various data analysis tools like Sort, Filter, Advanced, Text to Columns, Remove Duplicates, Data Validation, Consolidate, What-if Analysis, Group, Ungroup, Subtotal, and Hide Detail. The spreadsheet contains data from row 1 to 10, columns A through H. Column A is labeled 'ID' and contains patient IDs. Column B is labeled 'Name' and contains names like Horne, Adena S., Clemons, Tatyana V., etc. Column C is labeled 'Birthdate' and contains dates like 1935-03-24, 1944-12-03, etc. Column D is labeled 'Phone' and contains phone numbers like 1-307-230-3305, 1-546-668-2763, etc. Column E is labeled 'Address' and contains addresses like 9762 Consectetuer St., P.O. Box 660, 5274 Ligula St., etc. Column F is labeled 'City' and contains cities like Sunderland, Tintange, Sint-Pieters-Kapelle, etc. Column G is labeled 'Primary Physician' and contains names like Woodard, Joseph, Woodard, Joseph, Leblanc, Sarah, etc. Column H is labeled 'Last Huddle' and contains dates like 2016-04-09, 2015-01-16, 2016-01-25, etc. The status bar at the bottom right indicates 'All data is synthetic'.

1	ID	Name	Birthdate	Phone	Address	City	Primary Physician	Last Huddle
6300	16000325-7730	Horne, Adena S.	1935-03-24	1-307-230-3305	9762 Consectetuer St.	Sunderland	Woodard, Joseph	2016-04-09
6301	16000822-3547	Clemons, Tatyana V.	1944-12-03	1-546-668-2763	P.O. Box 660, 5274 Ligula St.	Tintange	Woodard, Joseph	2015-01-16
6302	16020302-2454	Martinez, Walker H.	1925-08-24	1-867-828-5797	677-6343 Sociosqu Rd.	Sint-Pieters-Kapelle	Leblanc, Sarah	2016-01-25
6303	16021028-2935	Chapman, Cassady V.	1940-10-02	1-207-905-0548	Ap #823-9438 Magna, Street	Richmond	Henderson, Christopher	2016-02-25
6304	16031215-4693	Serrano, Neil G.	1953-07-15	1-635-568-9697	9751 Rutrum, Av.	Voitsberg	Leblanc, Sarah	2016-05-19
6305	16051014-7622	Buchanan, Mason G.	1939-03-29	1-794-945-4798	P.O. Box 799, 3517 Cursus, St.	Modakeke	Leblanc, Sarah	2015-08-31
6306	16100426-5979	Patrick, Kuame E.	1940-12-16	1-380-323-7668	173-8559 Lacinia Ave	Oxford County	Woodard, Joseph	2016-06-21
6307	16110523-7737	Huff, Uriah H.	1927-05-17	1-857-474-6137	3511 Dictum Street	Neusiedl am See	Henderson, Christopher	2016-05-02
6308	16110826-4621	Estes, Brynne T.	1940-05-26	1-794-907-9427	4100 Vitae Avenue	Watson Lake	Leblanc, Sarah	2015-02-12
6309	16120306-5238	Johnston, Preston O.	1947-01-04	1-704-888-0360	An #683-9052 Amet, Ave	Ia Unión	Henderson, Christopher	2015-12-17

The Promise of Data-Driven Team Huddles

Team Huddles +

Electronic Health Records +

Clinical Risk Assessments

Better Outcomes at Lower Costs

Intervention Engine

- **Data-Driven Huddle Management**
 - Automated roster building
 - Guided huddle discussions
- **Enabling Features**
 - HL7 FHIR database and API
 - HL7 CDA data import
 - Custom population filters
 - Clinical risk assessment integration
- **Driving Principles**
 - Clinical pull trumps technical push
 - Delightful & effective user interfaces
 - Standards-based software interfaces
 - Open source (Apache 2.0)

Patients

Choose Patient (18)		
	Lynn, Catherine ² 91 yrs Female Inpatient - Good Samaritan	6 Dec 21, 2015
	Brown, Joseph ² 82 yrs Male Home	6 Dec 21, 2015
	Franklin, Edith ¹ 76 yrs Female Inpatient - Harbor	6 Dec 21, 2015
	Jacobs, Anne 65 yrs Female Home	5 Dec 21, 2015
	Kay, Mary ¹ 85 yrs Female Home	4 Dec 21, 2015
	Thompson, Theodore 92 yrs Male Home	4 Dec 21, 2015
	Anderson, Jane ¹ 65 yrs Female Home	3 Dec 21, 2015
	Lee, Jin 70 yrs Male Home	3 Dec 21, 2015
	Myers, Helen ¹ 65 yrs Female Home	3 Dec 21, 2015
	Charles, Jerry 70 yrs Male Home	3 Dec 21, 2015

Clinical Collaboration

- **Clinical pull trumps technical push**
 - It's not really about the tools and technologies
 - It's about the people and the processes
- **Collaboration w/ MedStar Health's Center for Successful Aging**
 - Forward-thinking geriatric practice using multidisciplinary team huddles
 - Designing a risk tool that considers clinical *and* psychosocial factors
- **Intervention Engine has had clinical input in from day one**
 - Visits to MedStar Good Samaritan Hospital to observe huddles
 - Bi-weekly meetings to discuss design, demonstrate progress, and plan next steps
- **Piloting in 2016, to be followed up by a randomized clinical trial**



Huddle Management

Huddle List

 Geriatrics



Dec 21, 2015 

- **Huddle rosters organized by date**
 - Lists patients to be discussed
 - See next and previous huddles
- **Automated huddle roster building**
 - Risk scores determine frequency
 - Significant events trigger addition
 - Near appointments trigger addition
- **Manually add patients to huddles**

Patients

Choose Patient (18)	
 Lynn, Catherine ²	6  Dec 21, 2015
 Brown, Joseph ²	6  Dec 21, 2015
 Franklin, Edith ¹	6  Dec 21, 2015
 Jacobs, Anne	5  Dec 21, 2015
 Kay, Mary ¹	4  Dec 21, 2015
 Thompson, Theodore	4  Dec 21, 2015
 Anderson, Jane ¹	3  Dec 21, 2015
 Lee, Jin	3  Dec 21, 2015
 Myers, Helen ¹	3  Dec 21, 2015
 Charles, Jerry	3  Dec 21, 2015

Risk Assessment ▾

Stroke 

Neg Outcome 

Choose Filters ▾

Populations ▾

All patients

65+ 

ER last 30d 

Alzheimer's 

+ add new

Risk Score ▾

1  6

Huddle List ▾

Geriatrics 

Dec 21, 2015

Choose Sort By ▾

Name

Age

Gender

Location

Risk 

Notifications

Population Filters

Populations

- All patients
- 65+ 
- ER last 30d 
- Alzheimer's 

- Filter by custom criteria based on
 - Demographics (e.g., age, gender)
 - Conditions
 - Recent encounters

Patients

Risk Assessment

- Stroke
- Neg Outcome

Choose Filters

Populations

- All patients
- 65+
- ER last 30d
- Alzheimer's

[+ add new](#)

Risk Score



Huddle List

- Geriatrics
- Dec 21, 2015

Choose Sort By

- Name
- Age
- Gender
- Location
- Risk
- Notifications

Choose Patient (18)

	Lynn, Catherine ²	6
	91 yrs Female Inpatient - Good Samaritan	Dec 21, 2015
	Brown, Joseph ² 82 yrs Male Home	6 Dec 21, 2015
	Franklin, Edith ¹ 76 yrs Female Inpatient - Harbor	6 Dec 21, 2015
	Jacobs, Anne 65 yrs Female Home	5 Dec 21, 2015
	Kay, Mary ¹ 85 yrs Female Home	4 Dec 21, 2015
	Thompson, Theodore 92 yrs Male Home	4 Dec 21, 2015
	Anderson, Jane ¹ 65 yrs Female Home	3 Dec 21, 2015
	Lee, Jin 70 yrs Male Home	3 Dec 21, 2015
	Myers, Helen ¹ 65 yrs Female Home	3 Dec 21, 2015
	Charles, Jerry 70 yrs Male Home	3 Dec 21, 2015

Filter Builder

43
patients137
conditions178
encountersin the last
year

Filter Type



Age >



Gender >



Condition >



Encounter >

Filter Details

 Patient agein isgreater than or equal to  Condition codefor system

is

331.0: Alzheimer's disease

65+ and Alzheimer's

Save Filter

Risk Assessment Integration

Risk Assessment ▾

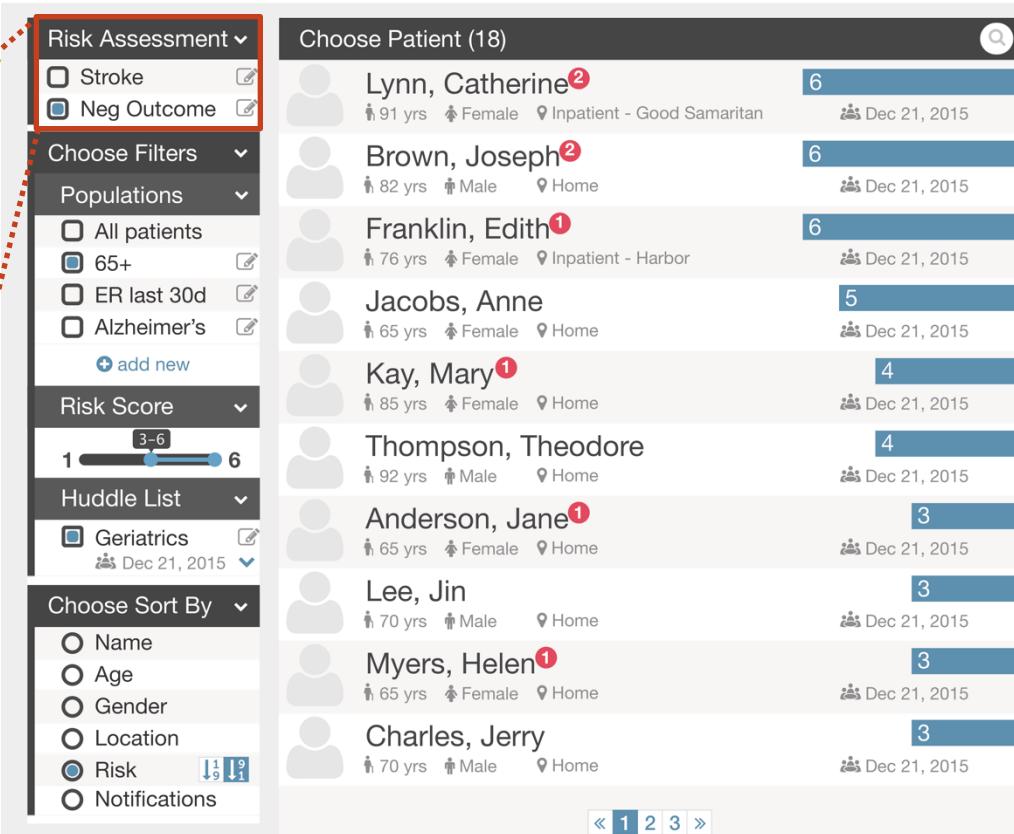
Stroke

Neg Outcome

- **Open Risk Assessment Integration API**
 - Using HL7 FHIR API and resources
 - FHIR notifications trigger recalculation

- **Reference implementation risk services**
 - CHA₂DS₂-VASc score for stroke
 - Negative Outcome

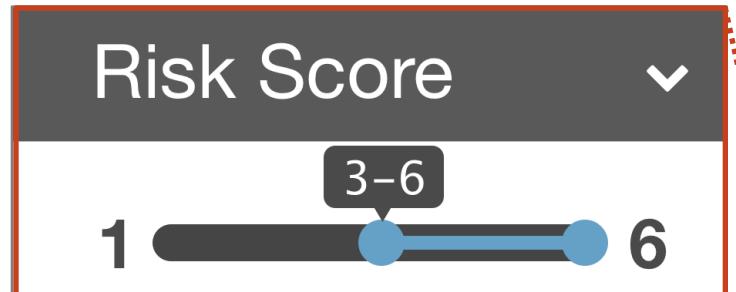
Patients



The screenshot shows the Intervention Engine application interface. On the left, a sidebar contains filters for 'Risk Assessment' (with 'Neg Outcome' selected), 'Choose Filters', 'Populations' (with 'All patients' selected), 'Risk Score' (with a slider from 1 to 6 at 6), 'Huddle List' (with 'Geriatrics' selected), and 'Choose Sort By' (with 'Risk' selected). The main panel displays a list of 18 patients, each with a profile picture, name, age, gender, location, and a blue progress bar indicating a value (ranging from 3 to 6). The patients listed are Lynn, Catherine; Brown, Joseph; Franklin, Edith; Jacobs, Anne; Kay, Mary; Thompson, Theodore; Anderson, Jane; Lee, Jin; Myers, Helen; and Charles, Jerry.

Choose Patient (18)			
Lynn, Catherine	2	6	Dec 21, 2015
Brown, Joseph	2	6	Dec 21, 2015
Franklin, Edith	1	6	Dec 21, 2015
Jacobs, Anne		5	Dec 21, 2015
Kay, Mary	1	4	Dec 21, 2015
Thompson, Theodore		4	Dec 21, 2015
Anderson, Jane	1	3	Dec 21, 2015
Lee, Jin		3	Dec 21, 2015
Myers, Helen	1	3	Dec 21, 2015
Charles, Jerry		3	Dec 21, 2015

Risk Assessment Integration



- Filter and sort by risk scores

6

- View patient risk scores at a glance

Patients

Risk Assessment

- Stroke
- Neg Outcome

Choose Filters

Populations

- All patients
- 65+
- ER last 30d
- Alzheimer's

Risk Score

- 3-6
- 1 6

Huddle List

- Geriatrics

Choose Sort By

- Name
- Age
- Gender
- Location
- Risk
- Notifications

Choose Patient (18)

Lynn, Catherine	6
91 yrs Female Inpatient - Good Samaritan	Dec 21, 2015
Brown, Joseph	6
82 yrs Male Home	Dec 21, 2015
Franklin, Edith	6
76 yrs Female Inpatient - Harbor	Dec 21, 2015
Jacobs, Anne	5
65 yrs Female Home	Dec 21, 2015
Kay, Mary	4
85 yrs Female Home	Dec 21, 2015
Thompson, Theodore	4
92 yrs Male Home	Dec 21, 2015
Anderson, Jane	3
65 yrs Female Home	Dec 21, 2015
Lee, Jin	3
70 yrs Male Home	Dec 21, 2015
Myers, Helen	3
65 yrs Female Home	Dec 21, 2015
Charles, Jerry	3
70 yrs Male Home	Dec 21, 2015

Patient Details

Lynn, Catherine²

91 yrs Female Home Dec 21, 2015

Patient demographics

- Name, gender, location, next huddle

Interventions (1)

Home

Angela Stark RN

High level clinical information

- Huddles, appointments, interventions, conditions, medications, allergies



Encounter Completed

Jan 27, 2015 // 11:00am

Dr. Anne Livingston

Clinical timeline of events

© 2016 The MITRE Corporation. ALL RIGHTS RESERVED.

Approved for Public Release; Distribution Unlimited. Case Number 16-0160.

Patients

Back to Patient List



Lynn, Catherine²

91 yrs Female Home Dec 21, 2015

Risk Assessment

Stroke

Neg Outcome

Huddle

Dec 21, 2015

Dec 14, 2015

more

Appointments (1)

Dec 24, 2015 9:00am

Interventions (1)

Home

Angela Stark RN

+ add new

Conditions (3)

Diabetes - Type II

High Blood Pressure

Cardiac Disease

Medications (3)

Medication 1

Medication 2

Medication 3



Risk: 6

Weight: 3

today

risk by category for last 6 months

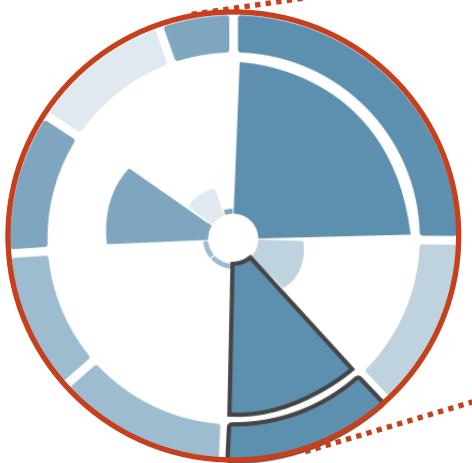
- Search timeline...
- Intervention Planned Jan 30, 2015 // 9:25am Angela Stark RN Home
- Risk Changed Jan 30, 2015 // 9:25am Angela Stark RN Medications: 3 → 3+
- Intervention Completed Jan 27, 2015 // 11:22am Dr. Anne Livingston Medication added: medication 3
- Encounter Planned Jan 27, 2015 // 11:21am Dr. Anne Livingston Outpatient: Feb 6, 2015 // 1:00pm Dr. Anne Livingston
- Encounter Completed Jan 27, 2015 // 11:00am Dr. Anne Livingston Outpatient: Jan 27, 2015 // 11:00am Dr. Anne Livingston

All data is synthetic

Risk Visualization



- Risk trend and current score**
 - Provides insight into risk stability



- Risk pie**
 - Provides insight into risk composition

Patients

Back to Patient List



Risk Assessment

- Stroke
- Neg Outcome

Huddle

- Dec 21, 2015
- Dec 14, 2015
- more

Appointments (1)

Dec 24, 2015 9:00am

Interventions (1)

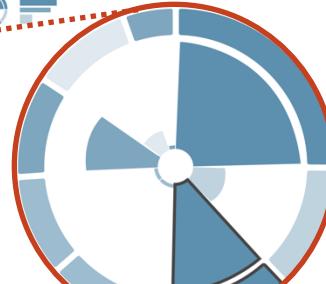
- Home
- Angela Stark RN
- + add new

Conditions (3)

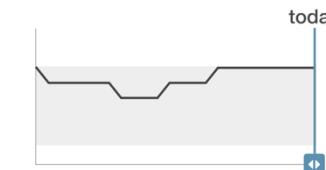
- Diabetes - Type II
- High Blood Pressure
- Cardiac Disease

Medications (3)

- Medication 1
- Medication 2
- Medication 3



Risk: 6
Weight: 3



risk by category for last 6 months



Search timeline...
Intervention Planned Jan 30, 2015 // 9:25am Angela Stark RN Home

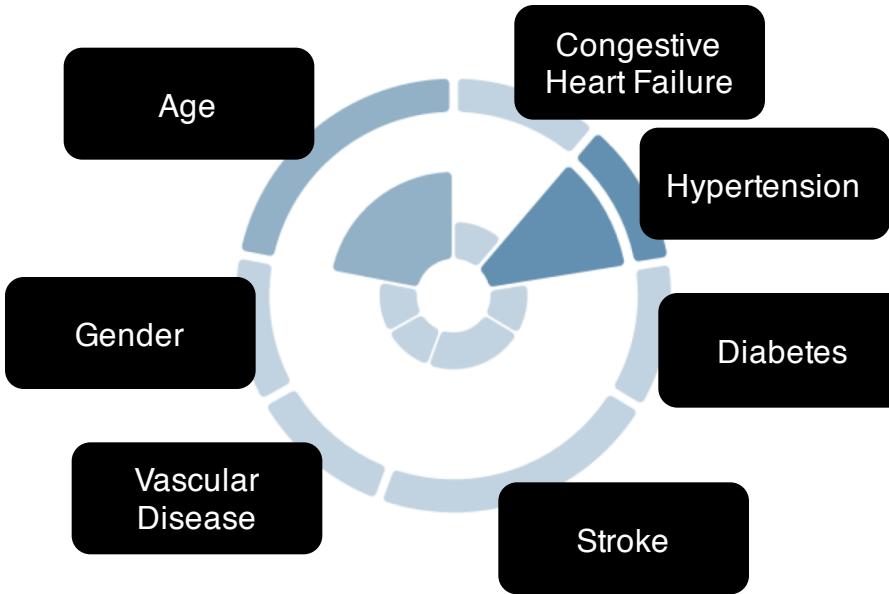
Risk Changed Jan 30, 2015 // 9:25am Angela Stark RN Medications: 3 → 3+

Intervention Completed Jan 27, 2015 // 11:22am Dr. Anne Livingston Medication added: medication 3 ▲

Encounter Planned Jan 27, 2015 // 11:21am Dr. Anne Livingston Outpatient: Feb 6, 2015 // 1:00pm Dr. Anne Livingston

Encounter Completed Jan 27, 2015 // 11:00am Dr. Anne Livingston Outpatient: Jan 27, 2015 // 11:00am Dr. Anne Livingston

Sample Risk Pie for CHA₂DS₂-VASc



Risk Assessment

Stroke:

2

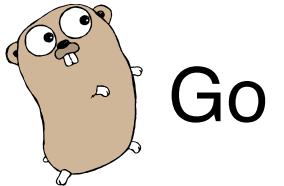
Choose category for more detail.

Implementation Details

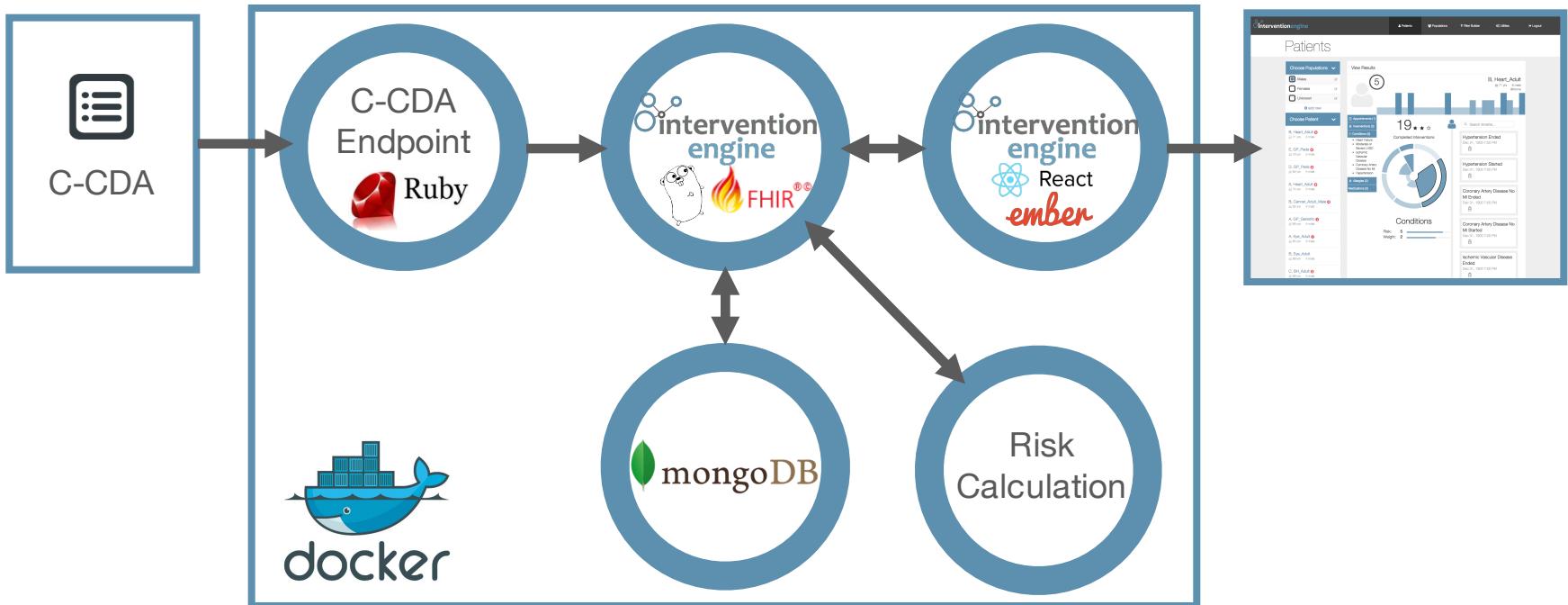
- Developed by MITRE and available on GitHub (Apache 2.0 license)



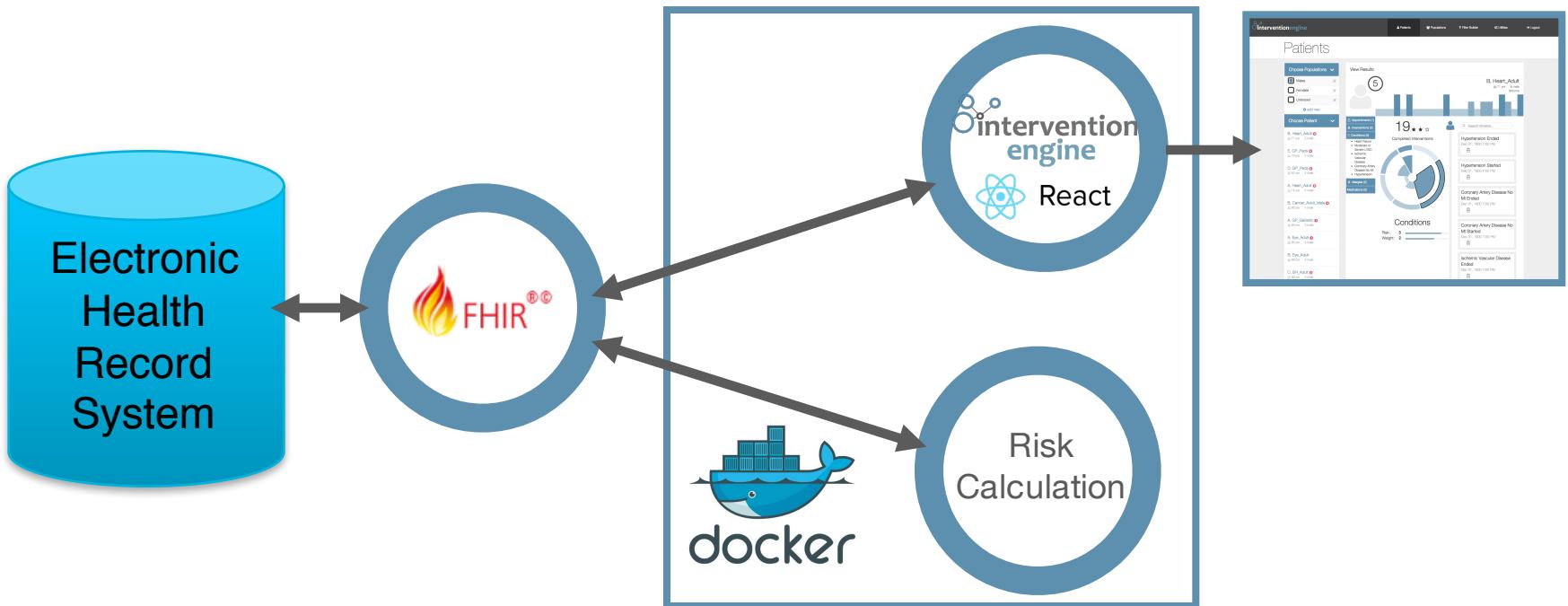
- Core Technologies



Current Architecture



Future Architecture



Get Involved!

- **If you're an engineer...**
 - Check out our code on GitHub
 - Contribute to our FHIR server, tools, or Intervention Engine app
- **If you're a vendor...**
 - Show us how we can integrate with your data
 - Integrate aspects of Intervention Engine into your product
- **If you're a provider...**
 - Tell us what's good, what's bad, and what we're missing
 - Contact us to find out more information

Thank You



Data-driven team huddles to improve care and reduce cost

Contact: intervention-engine-list@lists.mitre.org

<http://interventionengine.org>

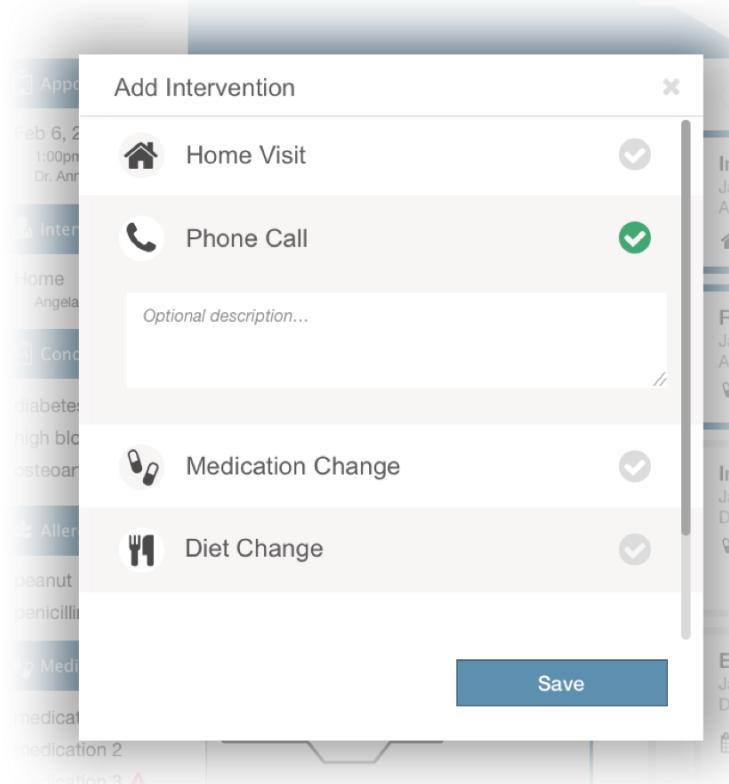
Citations

1. Dingley C, Daugherty K, Derieg MK, et al. Improving Patient Safety Through Provider Communication Strategy Enhancements. In: Henriksen K, Battles JB, Keyes MA, et al., editors. *Advances in Patient Safety: New Directions and Alternative Approaches* (Vol. 3: Performance and Tools). Rockville (MD) : Agency for Healthcare Research and Quality (US); 2008 Aug. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK43663/>
2. Special Reports: Christine A. Sinsky, Rachel Willard-Grace, Andrew M. Schutzbank, Thomas A. Sinsky, David Margolius, and Thomas Bodenheimer In Search of Joy in Practice: A Report of 23 High-Functioning Primary Care Practices Ann Fam Med May/June 2013 11:272-278; doi:10.1370/afm.1531

BACKUP

Future Feature: Intervention Planning

- **Interventions chosen in huddle**
 - Recorded in Intervention Engine
 - Assigned to responsible party
- **Toward a Learning Health System**
 - Intervention Engine
 - Tracks patient outcomes over time
 - Identifies patterns with interventions
 - Adjusts interaction based on results
- **Target: better outcomes at lower costs**



Future Feature: Populations View

interventionengine

Patients Populations Filter Builder Utilities Logout

Populations

Choose Populations ▾

- All patients
- 65+
- 65+ and ER last 30d
- 65+ and Alzheimer's

+ add new

Choose Provider ▾

- All providers
- Livingston, Anne, MD
- Stark, Angela, RN

All data is synthetic

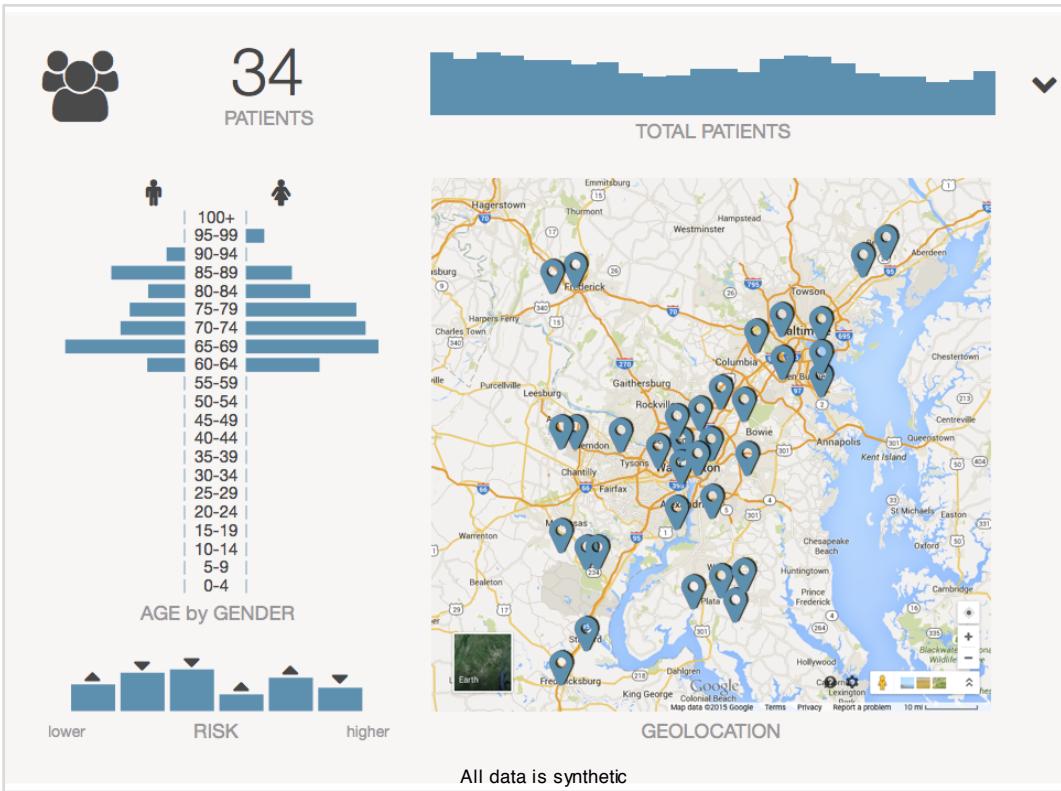
View Results in the last 6 mo.

All patients > Livingston, Anne, MD

Category	Count	Description
PATIENTS	34	TOTAL PATIENTS
SCHEDULED INTERVENTIONS	2	COMPLETED INTERVENTION EFFECTIVENESS
CONDITIONS	86	ACTIVE & CHRONIC CONDITIONS
MEDICATIONS	51	ACTIVE & HIGH RISK MEDICATIONS
ENCOUNTERS	284	EMERGENCY ROOM VISITS

All data is synthetic

Populations View: Demographics



Populations View: Interventions

 2 SCHEDULED INTERVENTIONS



COMPLETED INTERVENTION EFFECTIVENESS

Filter by: scheduled (2) completed (4)

Sort by: patient type date
 provider rating

 Anderson, Jane 68 yrs Female	 Home Visit Visit caretaker, Karen.	 Angela Stark, RN Scheduled May 30, 2015 9:25am	
 Jacobs, Anne 65 yrs Female	 Phone Call Check on medication.	 Angela Stark, RN Scheduled May 29, 2015 9:29am	
 Brown, Joseph 82 yrs Male	 Home Visit Visit caretaker, Karen.	 Angela Stark, RN Completed May 3, 2015 2:46pm	
 Franklin, Edith 76 yrs Female	 Medication Change Add Ibuprophen.	 Angela Stark, RN Completed Jan 30, 2015 4:03pm	
 Jacobs, Anne 65 yrs Female	 Diet Change No red meat.	 Angela Stark, RN Completed Mar 14, 2015 11:55am	
 Kay, Mary 85 yrs Female	 Home Visit Visit caretaker, Karen.	 Angela Stark, RN Completed Mar 28, 2015 9:29am	

All data is synthetic

Populations View: Conditions

 86 CONDITIONS 

ACTIVE & CHRONIC CONDITIONS

Filter by: active (86) chronic (29)

Sort by: condition patient date

Condition	Count	Last Update	Action
Cardiovascular Disease	3	3 !	
Anderson, Jane	68 yrs	Female	!
Franklin, Edith	76 yrs	Female	!
Jacobs, Anne	65 yrs	Female	!
Dementia	3	3 !	
Diabetes	9	9 !	

All data is synthetic

Populations View: Medications

 51 MEDICATIONS 

ACTIVE & HIGH RISK MEDICATIONS

Filter by: active (51) high risk (9)

Sort by: medication patient date

Carisoprodol !	3 	
Anderson, Jane 68 yrs Female	Prescribed Jul 20, 2015 9:25am	
Franklin, Edith 76 yrs Female	Prescribed Nov 18, 2014 11:27am	
Jacobs, Anne 65 yrs Female	Prescribed Jan 4, 2011 2:15pm	
Diphenhydramine !	6 	
Indomethacin !	3 	

All data is synthetic

Populations View: Encounters

