HIMSS18 The leading health information and technology conference

WHERE THE WORLD CONNECTS FOR HEALTH

Conference & Exhibition | March 5–9, 2018

Las Vegas | Venetian – Palazzo – Sands Expo Center

Implementation of a Clinical Trial Matching System

Session #225, March 8, 2018

Tufia Haddad, M.D.

MAYO CLINIC

ENGAGED

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Conflict of Interest

Tufia Haddad, M.D.

- Contracted Research/Grant Support: Takeda Oncology
- Consulting Fees: TerSera Therapeutics

Agenda

- Importance of clinical trials in healthcare
- Challenges to enrolling patients to clinical trials
- Training a cognitive system for clinical trial matching
- Process development and clinical implementation
- Quantitative and qualitative metrics
- Lessons learned

Learning Objectives

1) Describe how a cognitive system was developed and trained to address contemporary barriers to enrolling patients to clinical trials
2) Summarize the clinical implementation of a cognitive system and outline an approach to improve workflow
3) Evaluate qualitative and quantitative metrics following implementation of the clinical trial matching solution
4) Define the need for a culture shift to emerging technologies in healthcare

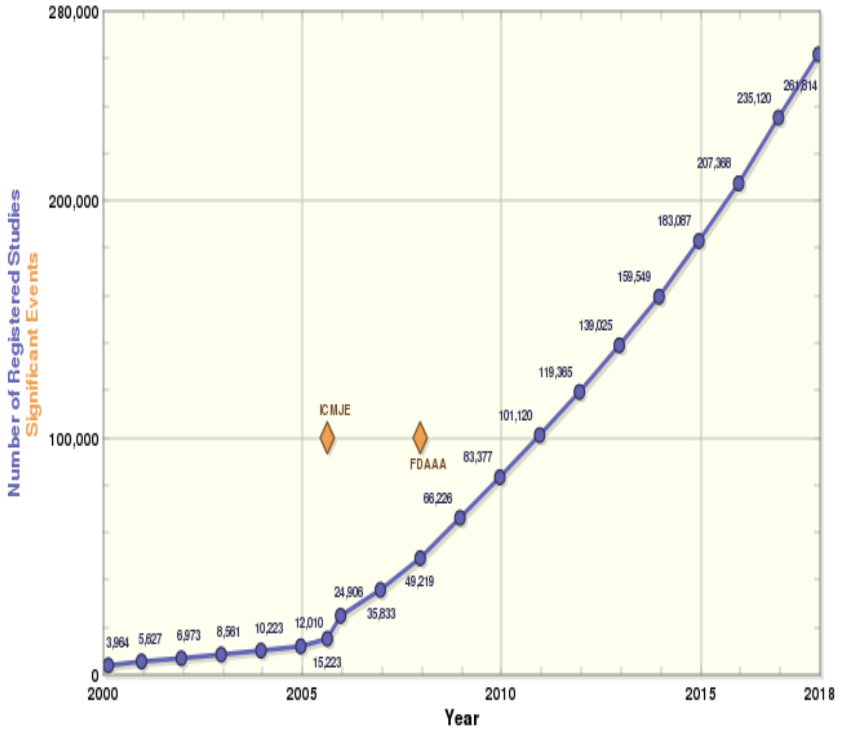
"The clinical data are trapped in doctor's notes that are unstructured free text that live in these complex electronic health records. And the data really are… they're shackled. And the data want to be free. So we're going to free the data."

Norman (Ned) Sharpless, MD
Director, National Cancer Institute
In his first address to NCI staff
December 2017

Why are clinical trials important to healthcare and patients?

How are patients evaluated for clinical trial opportunities today?

Studies Registered on clinicaltrials.gov



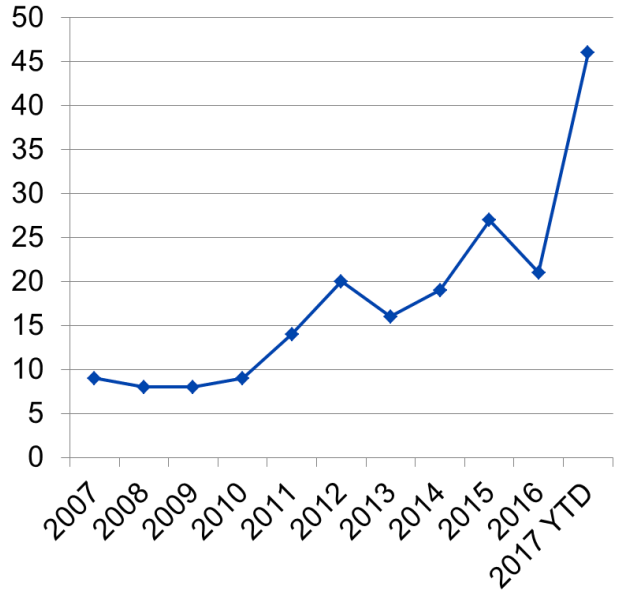
2017
263,476

2010
83,377

2005
12,010

#HIMSS18

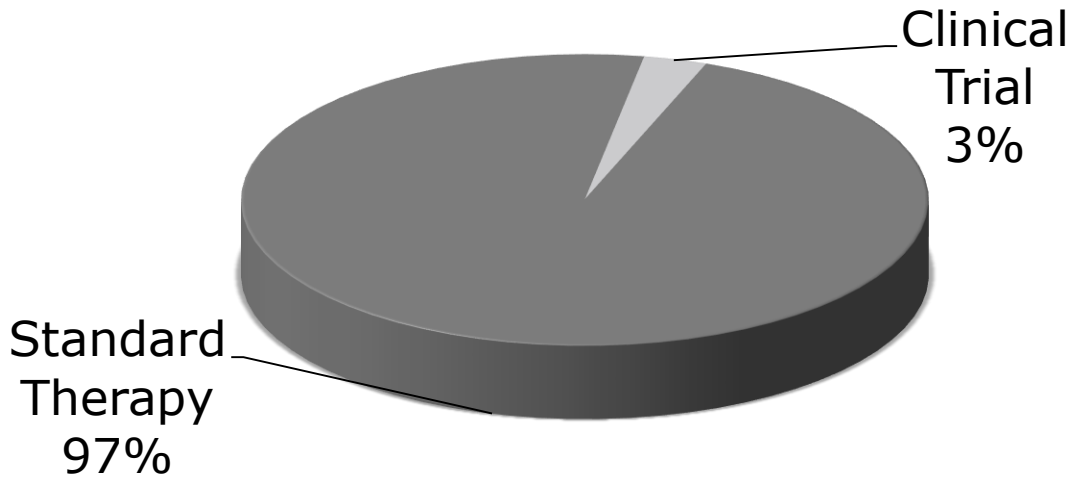
Cancer Therapy FDA Approvals 2007 - 2017



Source: www.fda.gov

U.S. Clinical Trial Facts

Cancer Patient Treatment by Standard Therapy or Clinical Trial



HEALTH

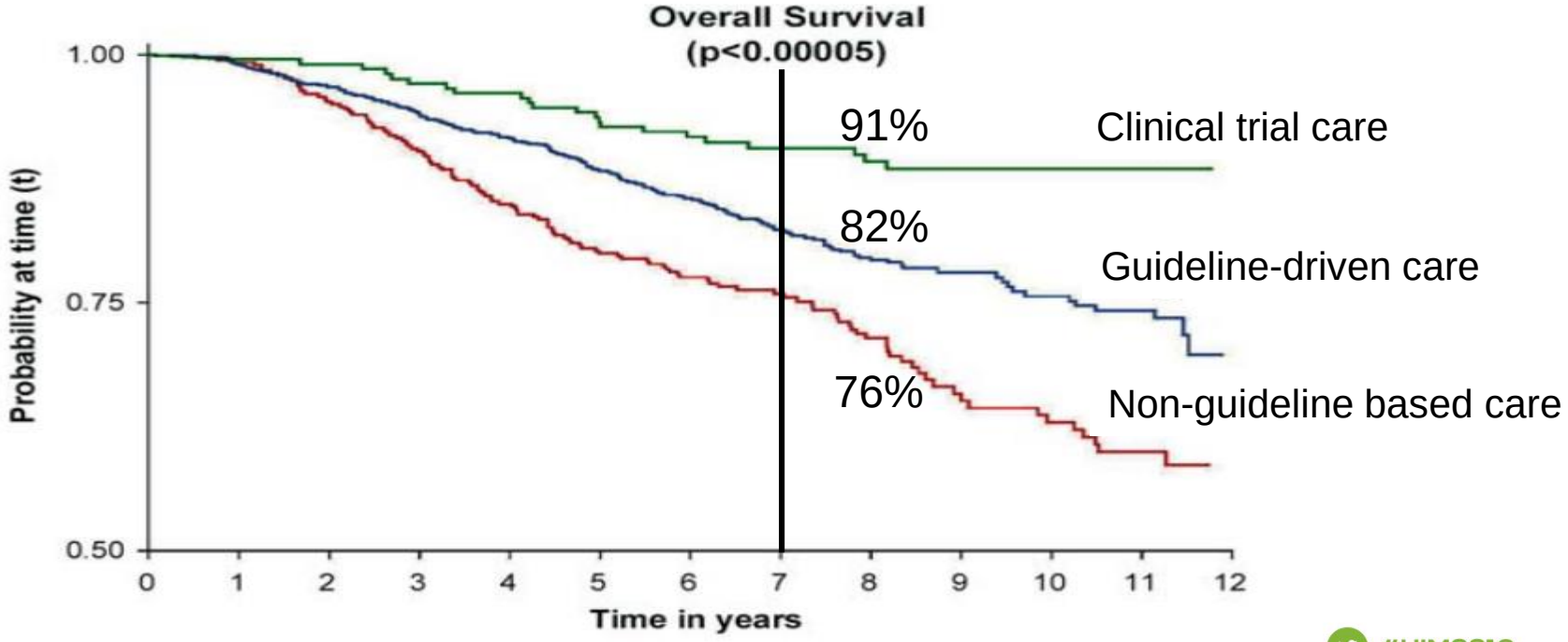
The New York Times

A Cancer Conundrum: Too Many Drug Trials, Too Few Patients

By GINA KOLATA AUG. 12, 2017

R Goldman et al. JAMA 2003, 289:2970.

Clinical Trial Participation May Improve Survival



Hebert-Croteau, et al. Breast Cancer Res Treat 91:279 2005

Challenges to Enrolling Patients on to Clinical Trials: Provider, Patient, Systemic

Challenges to Enrolling Patients on to Clinical Trials: Provider Barriers

- Patient visits focus on completing clinical care in the shortest time
  - All clinicians, including investigators, lack time to counsel patients
  - Patients on trials create additional time and clerical burden for providers through the duration of study participation
- Limited time and personnel to consistently screen patients for studies, and these resources are often not reimbursable
- Complex inclusion/exclusion criteria not codified in either the protocol or patient electronic health record

Challenges to Enrolling Patients on to Clinical Trials: Patient Barriers

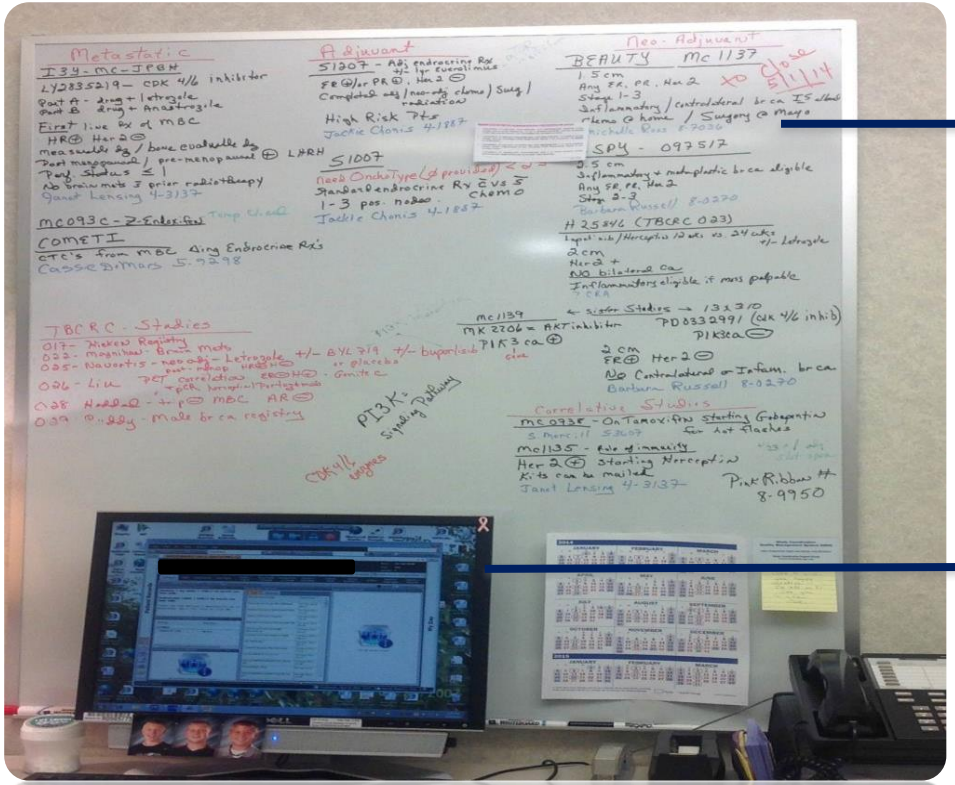
- "I do not want placebo"
- "I want something that's proven to be the best"
- "I want to pick the treatment"
- "Trials are inconvenient– I don't want the extra office visits and studies"
- "I just can't process this additional information right now..."
- "My insurance company might not pay"

Challenges to Enrolling Patients on to Clinical Trials : Systemic

The primary reason patients do not participate in studies is because they were not offered a study

NIH, NCI Working Group 2004.
NIH, NCI Survey 1997.

Clinical Trial Matching in Oncology - 2015



Trials

Match

Patient Data

Mayo Clinic Cancer Center Protocol Catalog

Refresh

Hematology

- Open
- Closed

Oncology

- Open
  - Brain/Neuro-Oncology (31)
  - Breast (57)
    - Early Stage Breast Canc
      - -Pre-Operative (6)
      - Adjuvant (1)
        - Adjuvant bisphospho
        - Adjuvant chemothera
        - Adjuvant endocrine th
        - Local/regional therap
        - her2positive (2)
    - Male Breast Cancer (1)
    - Metastatic Breast Cancer
      - Bone Mets (4)
      - Chemotherapy, HER2
      - Chemotherapy, HER2
      - Endocrine Therapy (8
      - Other targeted (non-H
    - No Known Breast Cance
      - Prevention (1)
      - Screening (1)
    - Non-invasive Breast Can
      - DCIS (1)
    - Prevention (1)
    - QOL/Symptom Control (3
      - Diet (0)
      - Lymphedema (0)
      - QOL/SymptomContro
    - Translational Research (
  - Endocrine (13)
  - Epidermal Toxicity (0)
  - Gastrointestinal (GI) (68)
  - Genetic Marker Studies (1)
  - Genitourinary (GU) (44)
  - Gynecological (107)
  - Head and Neck (22)
  - Lung (40)
  - Phase I (41)
  - Primary Unknown (1)
  - Sarcoma (23)
  - Skin (including Melanoma) (
  - Symptom Control (12)
- Closed

Protocol # Search

Advanced Searc

Protocol #: A011203

1 / 89 100%

ALLIANCE A011203

ALLIANCE FOR CLINICAL TRIALS IN ONCOLOGY

ALLIANCE A011203

A RANDOMIZED PHASE II TRIAL OF TAMOXIFEN VERSUS Z-ENDOXIFEN HCL IN POSTMENOPAUSAL WOMEN WITH METASTATIC ESTROGEN RECEPTOR POSITIVE, HER2 NEGATIVE BREAST CANCER

Investigational Agent: Z-Endoxifen HCl (NSC #750393, IND #110473) supplied by CTEP, DCTD, NCI.
Commercial Agent: Tamoxifen: (NSC #180973)
Clinical Trials.gov Identifier: NCT02311933

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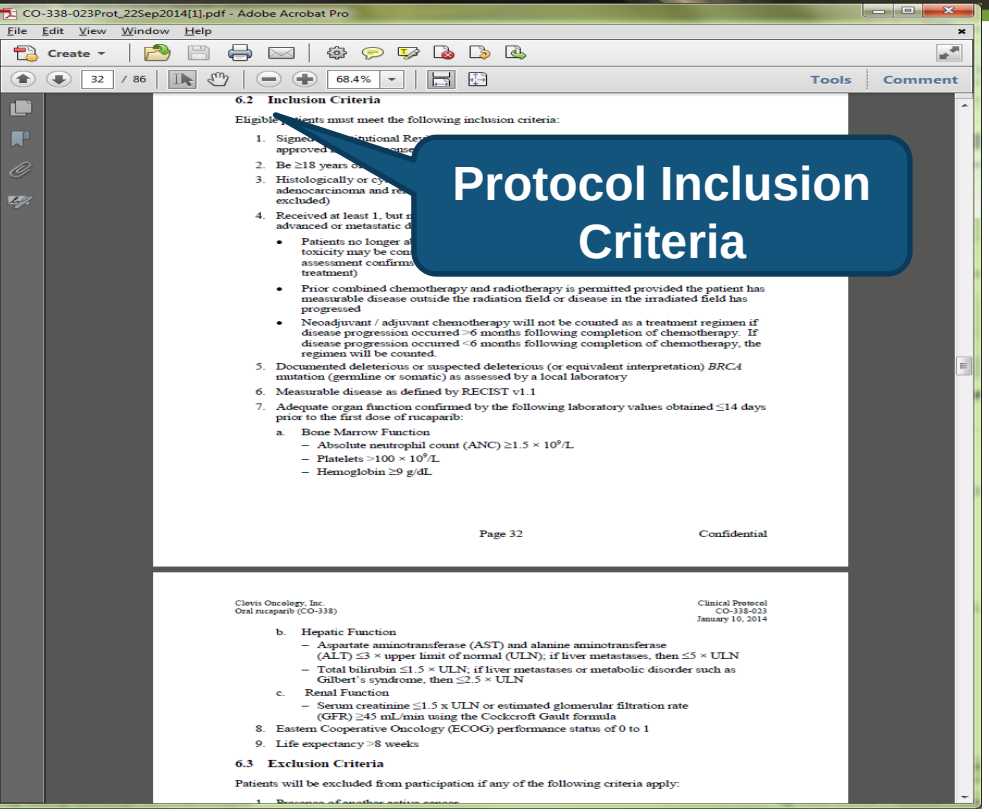
Solid Tumor Correlative Science Co-chairs
W. Fraser Symmans, MD
The University of Texas MD
John R. Hawse, PhD
Mayo Clinic
Minetta Liu, MD
Mayo Clinic


CO-338-023Prot_22Sep2014[1].pdf - Adobe Acrobat Pro

File Edit View Window Help

Create

32 / 86 68.4% Tools Comment

6.2 Inclusion Criteria

Eligible patients must meet the following inclusion criteria:

1. Signed informed consent approved
2. Be ≥18 years
3. Histologically or cy adenocarcinoma and re excluded)
4. Received at least 1, but advanced or metastatic d
   - Patients no longer a toxicity may be con assessment confirm treatment)
   - Prior combined chemotherapy and radiotherapy is permitted provided the patient has measurable disease outside the radiation field or disease in the irradiated field has progressed
   - Neoadjuvant / adjuvant chemotherapy will not be counted as a treatment regimen if disease progression occurred >6 months following completion of chemotherapy. If disease progression occurred <6 months following completion of chemotherapy, the regimen will be counted.
5. Documented deleterious or suspected deleterious (or equivalent interpretation) *BRCA* mutation (germline or somatic) as assessed by a local laboratory
6. Measurable disease as defined by RECIST v1.1
7. Adequate organ function confirmed by the following laboratory values obtained ≤14 days prior to the first dose of rucaparib:
   a. Bone Marrow Function
      - Absolute neutrophil count (ANC) ≥1.5 × 10^9/L
      - Platelets >100 × 10^9/L
      - Hemoglobin ≥9 g/dL

Page 32 Confidential

Clovis Oncology, Inc. Clinical Protocol
Oral rucaparib (CO-338) CO-338-023
January 10, 2014

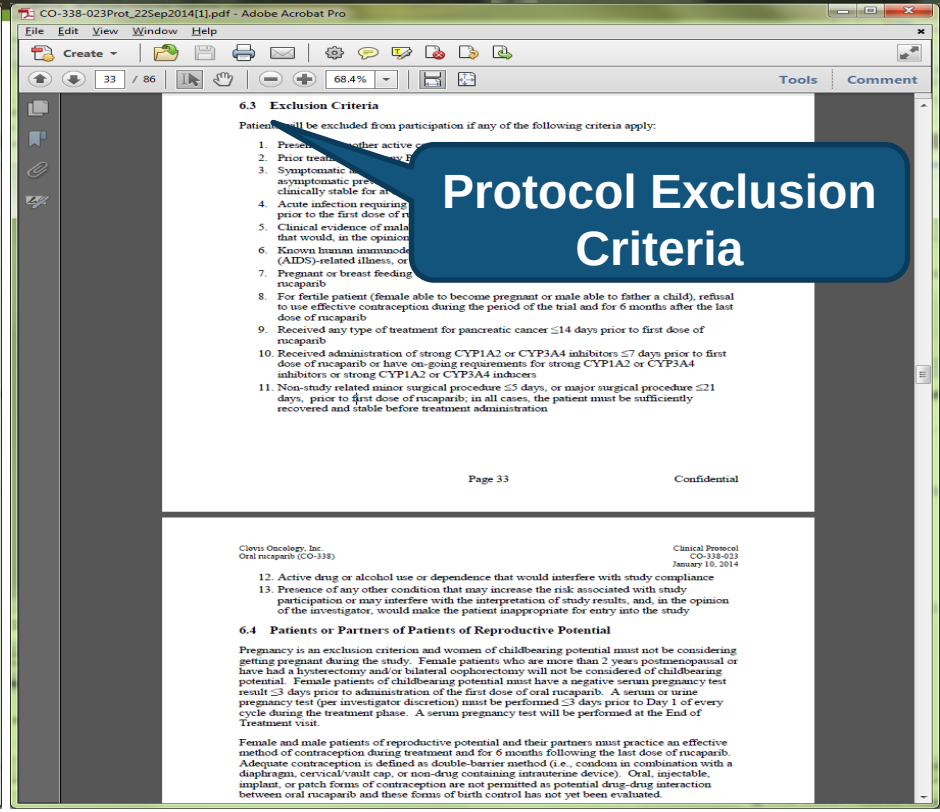
   b. Hepatic Function
      - Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) ≤3 × upper limit of normal (ULN); if liver metastases, then ≤5 × ULN
      - Total bilirubin ≤1.5 × ULN; if liver metastases or metabolic disorder such as Gilbert's syndrome, then ≤2.5 × ULN
   c. Renal Function
      - Serum creatinine ≤1.5 x ULN or estimated glomerular filtration rate (GFR) ≥45 mL/min using the Cockcroft Gault formula
8. Eastern Cooperative Oncology (ECOG) performance status of 0 to 1
9. Life expectancy >8 weeks

6.3 Exclusion Criteria

Patients will be excluded from participation if any of the following criteria apply:

1. Presence of another active

Protocol Inclusion Criteria


CO-338-023Prot_22Sep2014[1].pdf - Adobe Acrobat Pro

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33 / 86 68.4% Tools Comment

6.3 Exclusion Criteria

Patients will be excluded from participation if any of the following criteria apply:

1. Presence of another active
2. Prior treatment
3. Symptomatic asymptomatic pre clinically stable for at
4. Acute infection requiring prior to the first dose of r
5. Clinical evidence of mala that would, in the opinion
6. Known human immunod (AIDS)-related illness, or
7. Pregnant or breast feeding rucaparib
8. For fertile patient (female able to become pregnant or male able to father a child), refusal to use effective contraception during the period of the trial and for 6 months after the last dose of rucaparib
9. Received any type of treatment for pancreatic cancer ≤14 days prior to first dose of rucaparib
10. Received administration of strong CYP1A2 or CYP3A4 inhibitors ≤7 days prior to first dose of rucaparib or have on-going requirements for strong CYP1A2 or CYP3A4 inhibitors or strong CYP1A2 or CYP3A4 inducers
11. Non-study related minor surgical procedure ≤5 days, or major surgical procedure ≤21 days, prior to first dose of rucaparib; in all cases, the patient must be sufficiently recovered and stable before treatment administration

Page 33 Confidential

Clovis Oncology, Inc. Clinical Protocol
Oral rucaparib (CO-338) CO-338-023
January 10, 2014

12. Active drug or alcohol use or dependence that would interfere with study compliance
13. Presence of any other condition that may increase the risk associated with study participation or may interfere with the interpretation of study results, and, in the opinion of the investigator, would make the patient inappropriate for entry into the study

6.4 Patients or Partners of Patients of Reproductive Potential

Pregnancy is an exclusion criterion and women of childbearing potential must not be considering getting pregnant during the study. Female patients who are more than 2 years postmenopausal or have had a hysterectomy and/or bilateral oophorectomy will not be considered of childbearing potential. Female patients of childbearing potential must have a negative serum pregnancy test result ≤3 days prior to administration of the first dose of oral rucaparib. A serum or urine pregnancy test (per investigator discretion) must be performed ≤3 days prior to Day 1 of every cycle during the treatment phase. A serum pregnancy test will be performed at the End of Treatment visit.

Female and male patients of reproductive potential and their partners must practice an effective method of contraception during treatment and for 6 months following the last dose of rucaparib. Adequate contraception is defined as double-barrier method (i.e., condom in combination with a diaphragm, cervical/vault cap, or non-drug containing intrauterine device). Oral, injectable, implant, or patch forms of contraception are not permitted as potential drug-drug interaction between oral rucaparib and these forms of birth control has not yet been evaluated.

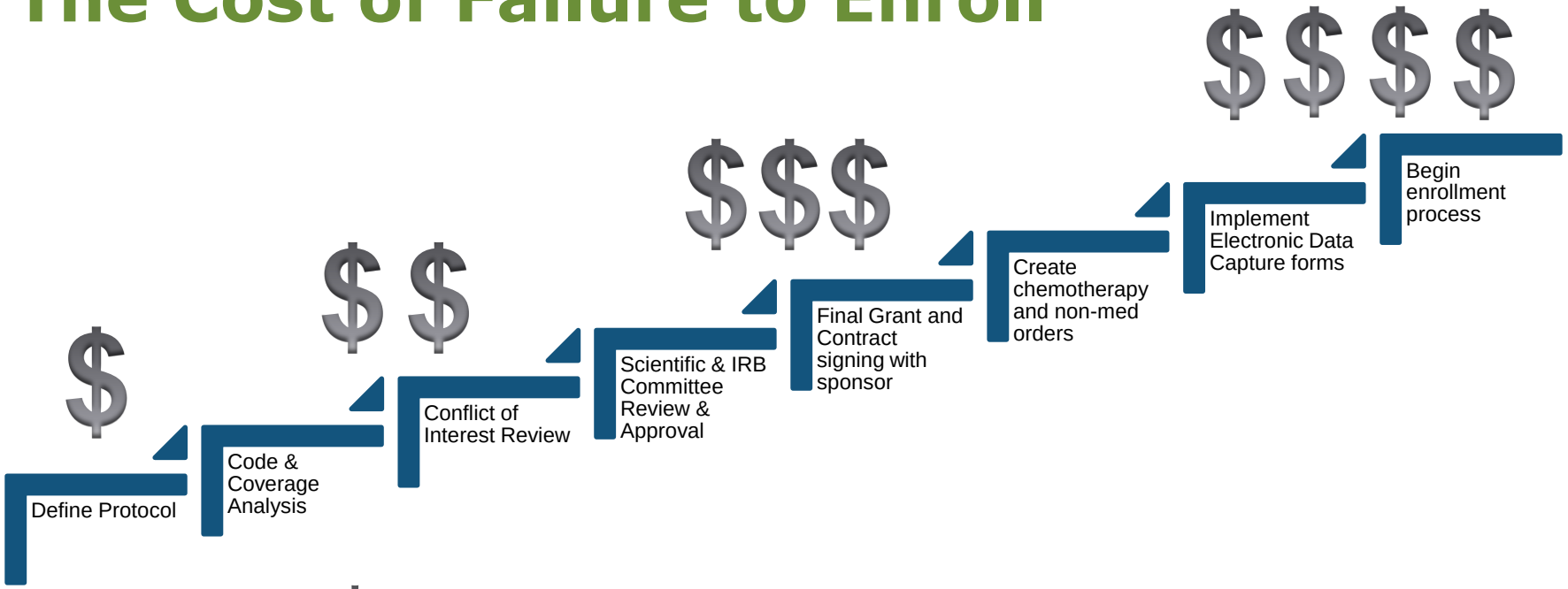
Protocol Exclusion Criteria

National Benchmarks for Cancer Clinical Trial Enrollment

- All phase I-III studies supported by the NCI - Cancer Therapy Evaluation Program between 2000–2007 (n=764)
  - 82% of clinical trials do not meet accrual (enrollment) goals within the anticipated study period
  - 37% fail to achieve a minimum accrual goal
- More than 1 in 5 NCI-sponsored trials fail to enroll a single subject

Cheng et al. Clin Cancer Res. 2011:17;1947-55.
S Ramsey and J Scoggins. The Oncologist 2008:13;923.

The Cost of Failure to Enroll



Up to $30-50,000 lost per trial

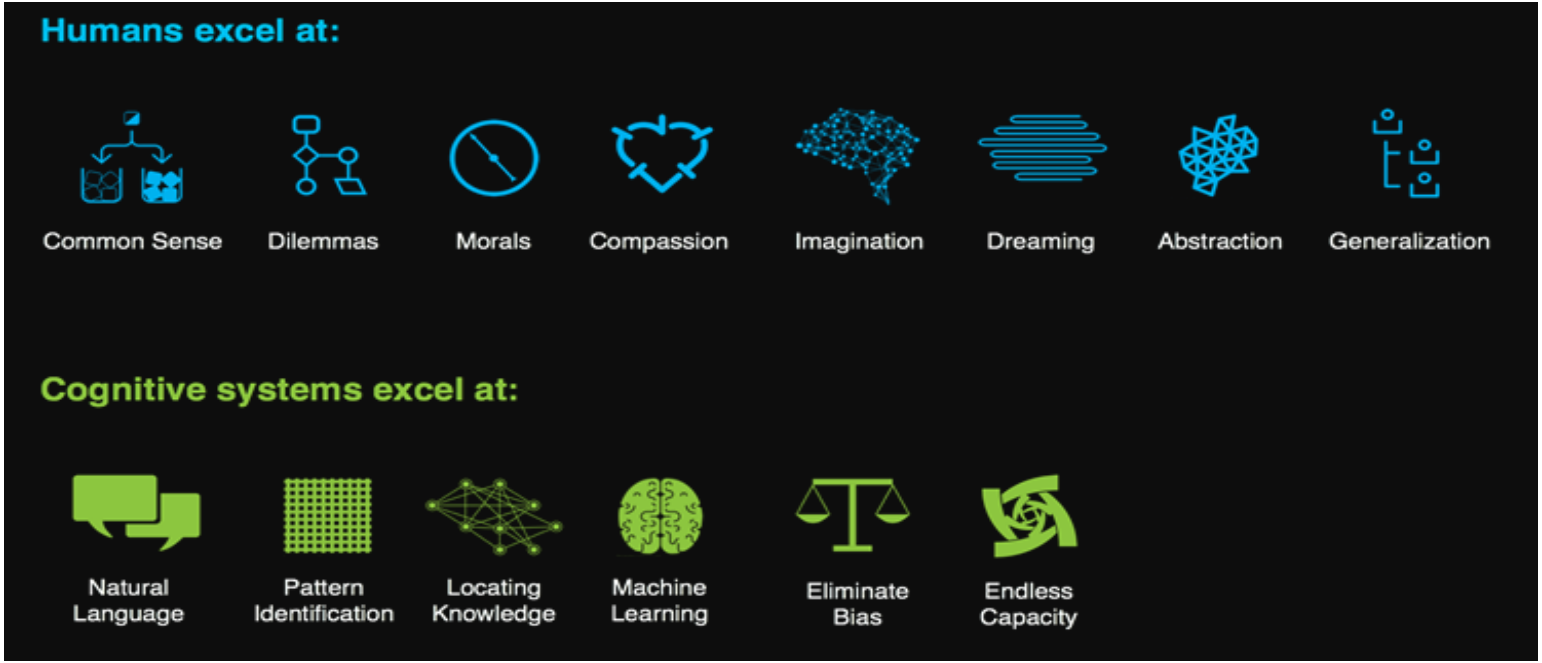
Training a cognitive system for clinical trial matching

Why do we need a cognitive solution?

Mayo Clinic Cancer Center Clinical Trials

- 459 active drug therapy trials and 41 oncologists for solid tumors
- 217 active drug therapy trials and 51 hematologists for hematologic cancers
- 993 active studies closed to enrollment

Why Leverage a Cognitive Computing System?



Cognitive System Attributes

Learning

- Extent the system improves over time with exposure to new data

Understanding

- Measured by the ability to interpret and derive actionable information and knowledge

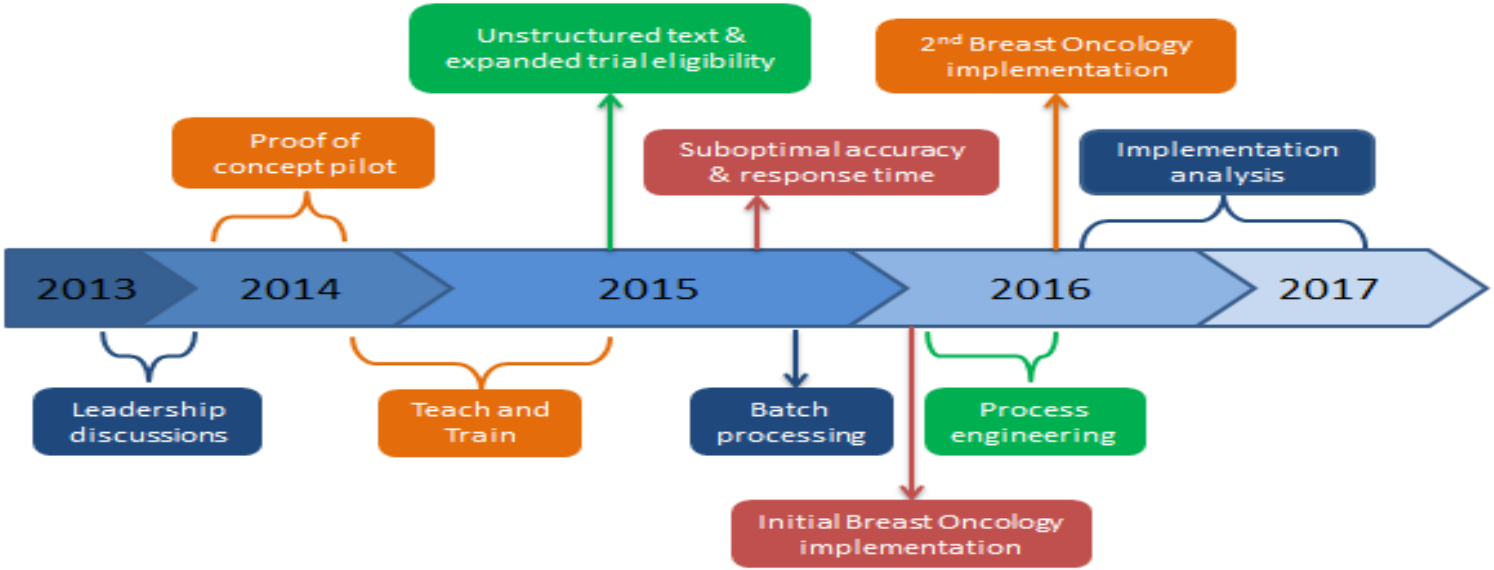
Reasoning

- Ability to link together data/information elements, draw connections from knowledge resources and solve problems using the information

Interacting

- Recognition of and leveraging available content to fit naturally in workflow and provide interactions that work best for users

Scientific Progress in the Development of a Cognitive System for Clinical Trial Matching



System initially trained to support Gastrointestinal*, Breast and Lung cancers

** GI comprised of 10 separate cancers*

Teach and Train: Set up

- Database setup for de-identified patient data
- Patient and Tumor attributes and definitions
- Most attributes are stored in unstructured text notes & reports

Breast Cancer Attributes *

- Patient setting
- Menopause status
- ER status
- PR status
- HER2 status
- BRCA1 mutation
- BRCA2 mutation
- Anthracycline chemotherapy in adjuvant or neoadjuvant setting
- Taxane chemotherapy in adjuvant or neoadjuvant setting
- Hormonal therapy in the adjuvant or neoadjuvant setting
- cT category
- cN category
- pT category
- pN category
- Tumor size
- Stage
- Histology
- Inflammatory carcinoma
- Measurable metastasis
- Prior breast surgery (type)
- Brain metastasis
- Lines of chemotherapy in the metastatic setting
- Hormonal therapy in the metastatic setting
- Any prior immunotherapy
- Resectable disease
- Performance status
- 21 gene recurrence score
- Labs

*partial list

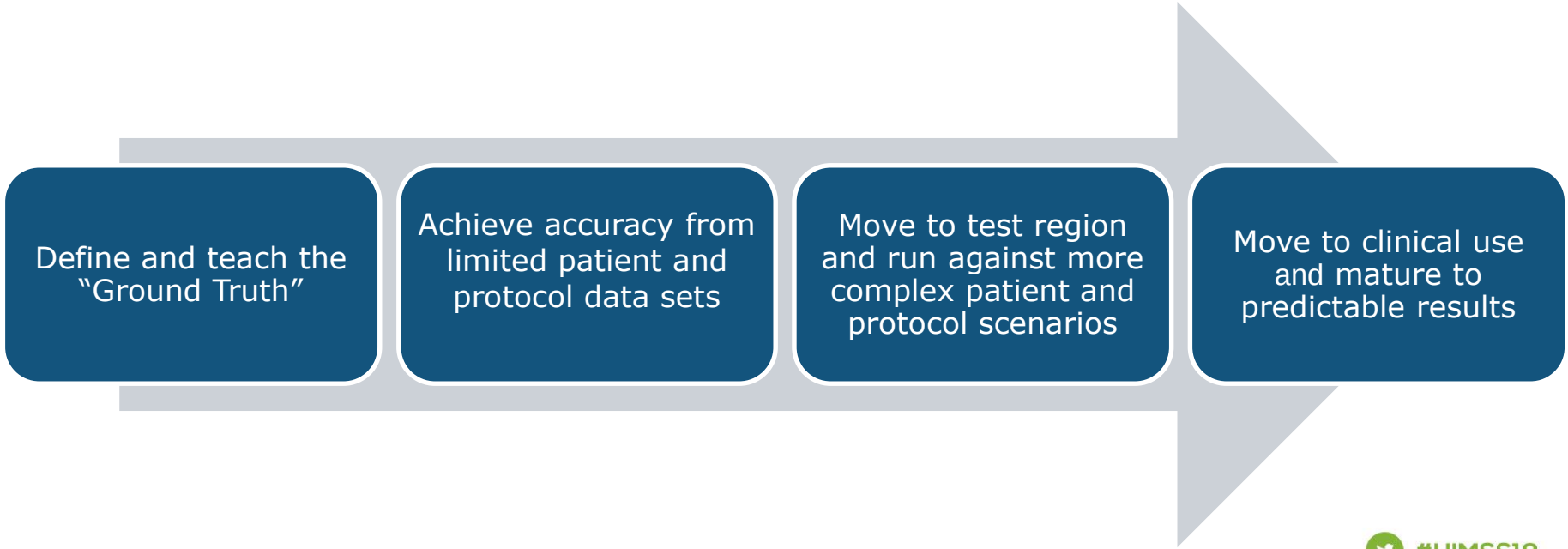
Teach and Train Cycles: Results

Teach and Train refers to the iterative process of loading information into the cognitive system, validating the results, and consequently adjusting the system for accuracy

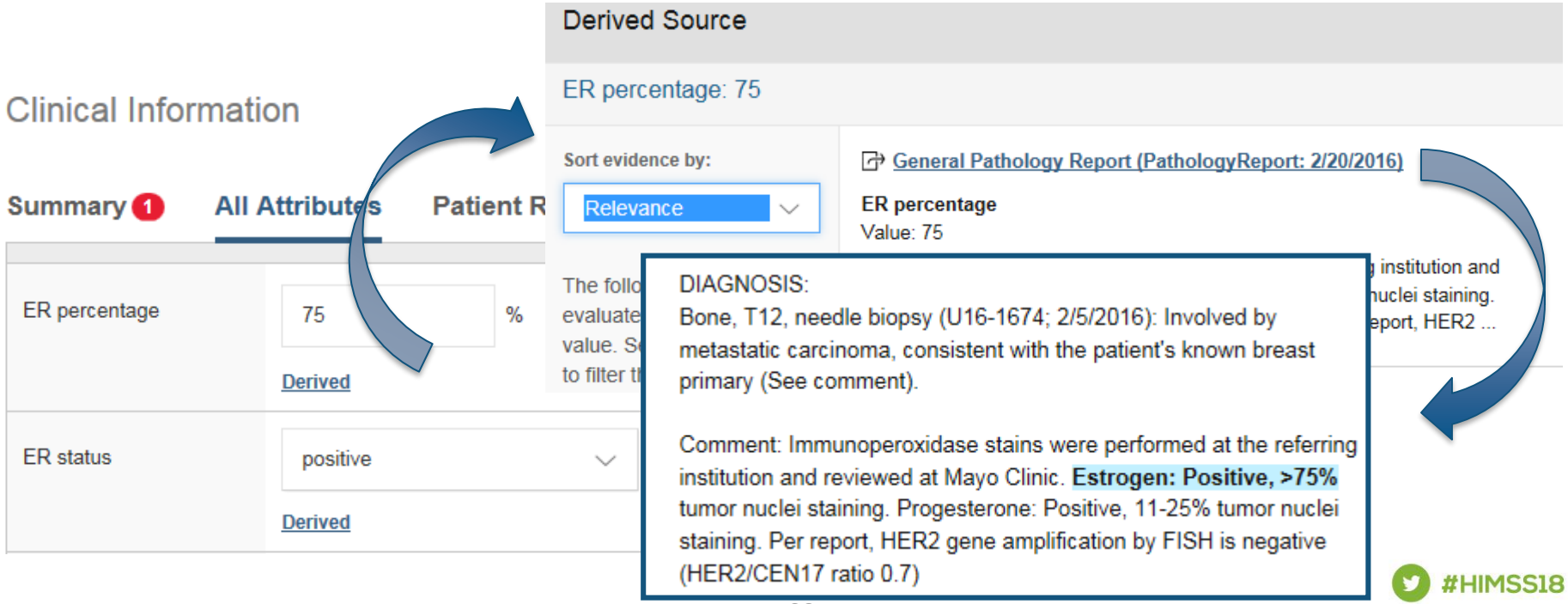
Breast Cancer Patient 907

	Teach Cycle											
Trials	3	4	5	6	7	8	9	10	11	12	13	14
nct01042379	X	X	X	X	X	X	X	X	X	X	X	X
nct01144468	_	_	X	X	O	O	O	O	O	O	X	X
nct01196936	_	_	O	O	O	O	X	X	X	X	X	X
nct01242800	O	O	X	X	X	X	X	X	X	X	X	X
nct01302405	O	O	O	O	O	X	X	X	X	X	X	X
nct01327781	O	O	O	O	X	X	X	X	X	X	X	X
nct01439711	_	_	X	O	O	X	X	X	X	X	X	X
nct01494662	O	X	X	X	O	O	X	X	X	X	X	X
nct01573442	O	O	O	O	O	X	X	X	X	X	X	X
nct01606241	X	X	X	X	X	X	X	X	X	X	X	X
nct01670877	_	_	O	O	X	X	O	O	X	X	X	X
nct01674140	_	_	O	O	O	O	O	X	X	X	X	X
nct01723774	_	_	_	_	_	_	_	X	X	X	X	X
nct01776008	_	_	X	X	X	X	X	X	X	X	X	X
nct01969643	_	_	O	O	O	O	O	X	X	X	X	X
nct02037529	_	_	O	O	O	X	O	X	X	X	X	X
nct02057133	_	_	O	O	O	O	O	X	X	X	X	X

The Teach & Train Continuum

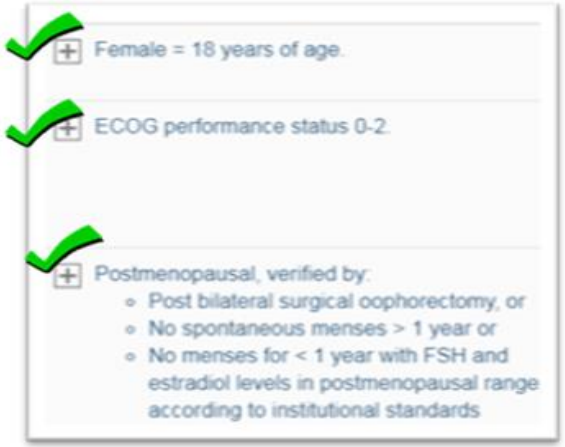


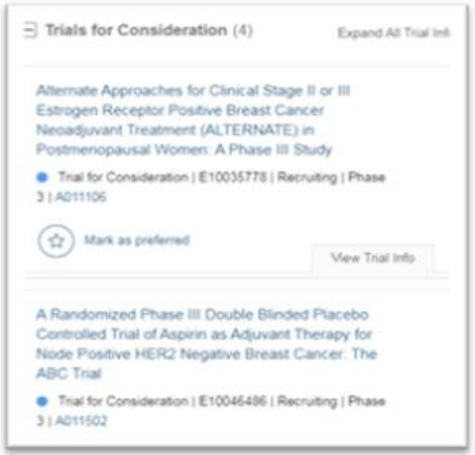
Data Derivation



Validation of Screening Results

Patient Attributes ✓ *Validated* → **Trial Eligibility Criteria** ✓ *Validated* → **List of Potential CT Opportunities**





Teach and Train: Progress

	Initial system functionality
Derivation of patient and tumor attribute data elements	Manual entry
Protocol eligibility criteria	clinicaltrials.gov
Time to derive patient and tumor attributes	60-180 seconds
Data quantity	All data
Natural language processing	Limited

Training a Cognitive System to Address Critical Clinical Trial Matching Barriers

- Reduces time and cognitive effort needed to screen a patient for clinical trial opportunities
  - Derives critical patient and tumor attribute information from the EHR required for matching, including data from unstructured text
  - Matches these attributes to lists of eligibility criteria from multiple studies
  - Generates a refined list of clinical trial opportunities
- Overcomes some of the limitations of the clinicians being the gatekeeper to trial opportunities
  - *Contingent on trial matching results being made available directly to patients*

Clinical Implementation of a Cognitive System for Clinical Trial Matching

Clinical implementation: Provider readiness

- User identification and System training – Breast Cancer
  - Care team members (18)
  - Clinical research and data coordinators (7)
  - Oncology fellows (30)
- System project team in clinic with care teams for an hour each morning and afternoon for technical assistance during the initial 2 weeks

Clinical implementation: Patient readiness

MAYO CLINIC

Mayo Clinic Clinical Trial Matching

Mayo Clinic Clinical Trial Matching

Clinical trials give patients access to new and emerging treatments, yet only 5% of patients with cancer choose to participate in trials nationwide. One reason there is such low research participation is that it is difficult for patients and research staff to find the appropriate studies.

In order to make this process more efficient, Mayo Clinic has teamed up with IBM to develop Watson Clinical Trial Matching. Watson can take in large amounts of information about studies and then can quickly search patient records to find any matches. This new tool will help Mayo to quickly match potentially eligible patients to open Mayo clinical trials. Watson will help ensure that Mayo patients can be accurately and consistently considered for promising clinical trial opportunities at Mayo Clinic.

Please ask a member of your cancer care team about Watson!

What is clinical research?

Clinical research involves people who volunteer to participate in studies that lead to better ways to prevent, diagnose and treat and understand health conditions.

What are the types of clinical research?

- Prevention Studies look at ways to stop diseases from occurring. Options may include medicines, vaccines, or lifestyle changes.
- Screening Studies test for better ways to detect certain diseases or health conditions.
- Diagnostic Studies look for better tests or procedures for diagnosing a disease or condition.
- Treatment Studies test new therapies, combinations of drugs, new approaches to surgeries, or use of integrative medicine.
- Genetic Studies look at what you inherit from your family, and may be independent or part of other types of research.
- Quality of Life Studies explore ways to improve people's comfort and manage symptoms of chronic illness or side effects of treatment.
- Medical Record Studies review information from large groups of people to better understand, detect, control and treat health-related conditions.

What is a clinical trial?

A clinical trial is a research study created to answer specific questions about new therapies or new ways of using known treatments. Clinical trials are used to determine whether new drugs or treatments are both safe and effective. Clinical trials take place in phases. For a treatment to become standard, it must first go through 2 or 3 clinical trial phases.

What about ethics and safety?

All clinical research conducted at Mayo Clinic is reviewed and approved by Mayo Clinic's Institutional Review Board (IRB). Other groups, such as specialized committees and colleagues, may also provide review of the research. Federal rules help make sure clinical research is done in a safe and ethical manner.

What should I consider?

Consider your benefits, risks and inconveniences before enrolling. Benefits may include earlier access to new clinical approaches and regular attention from a research team. Risks of participation are different for each study and may include side effects. Inconvenience may include more required visits with the research team.

How can I get involved?

There are many different ways to participate in clinical research at Mayo Clinic. Volunteers may be healthy, at risk for developing a disease, or already diagnosed with a disease or illness. You can agree to be in a study, give permission to have your medical record reviewed for research, or you can give permission for use of your blood and tissue samples.

What questions should I ask?

You should know as much as possible about the study before agreeing to participate. The following questions may be helpful for you to talk about with your research team:

- What is the purpose of the study?
- What kinds of tests or treatments are involved?
- Will I have to pay for anything?
- What are the benefits, risks and inconveniences?
- Other

Where do I get more information?

http://www.mayo.edu/research/clinical-trials

For questions about participating in clinical research at Mayo Clinic, call one of the following numbers:
Mayo Clinic Cancer Center
Clinical Trials Referral Office
(855) 776-0015
Cancer-related clinical research questions

Mayo Clinic Research
Volunteer Program
(800) 664-4542
General clinical research questions

MAYO CLINIC | mayoclinic.org
200 First Street SW | Rochester, MN 55905

MC4107-220

Clinical implementation: Systemic readiness

- IRB/RPR (Request Preparatory to Research) approvals obtained to allow the team to look at patient records for the purpose of trial screening
- Identification of patient lists for batch processing prior to point of care
- System support team created with phone and email support to all users

Clinical Implementation in Breast Oncology

1st Iteration

Failed

Clinician use of the system at point of care

The system added work to MD and RN day

2nd Iteration

Improved

Research coordinators validate list of trials in the system day prior to point of care

3rd Iteration

Success!

Clinical Assistants attached the list of trials to rooming sheets for all patient visits

Health Systems Engineering

MAYO CLINIC

«Clinic» «Color»
«Name»
«Date» «Time» «Location»

Coversheet: Breast

___ No systemic therapy trials available

_X_ Preferred Trials: High-level review completed by Research Coordinator

___ Trials for Consideration:

- Future opportunities when patient has met additional inclusion criteria (currently unmet modifiable criteria are present)
- Trials that have a closed arm or were not reviewed by a Coordinator

___ New registration patient with limited information available. Please access to further screen patient.

Please note that the trials listed are POTENTIAL opportunities.

Please contact the Clinical Research Coordinator to confirm eligibility.

Attention Providers!!! **Please answer the following questions**	**Please circle your response**
Which provider met with the patient?	**Smith, Jones, Fellow_____**
Was there a discussion with the patient regarding clinical trials?	• **Yes** • **No**
If the patient was offered a clinical trial, what was the result of the discussion?	• **Not a candidate at this time** • **Patient Contemplating** • **Patient Consented** • **Patient Declined**
Please provide additional comments (e.g. reason not eligible, screening errors, etc).	

For Ad Hoc screening: Contact the screening team at xxx-xxxx

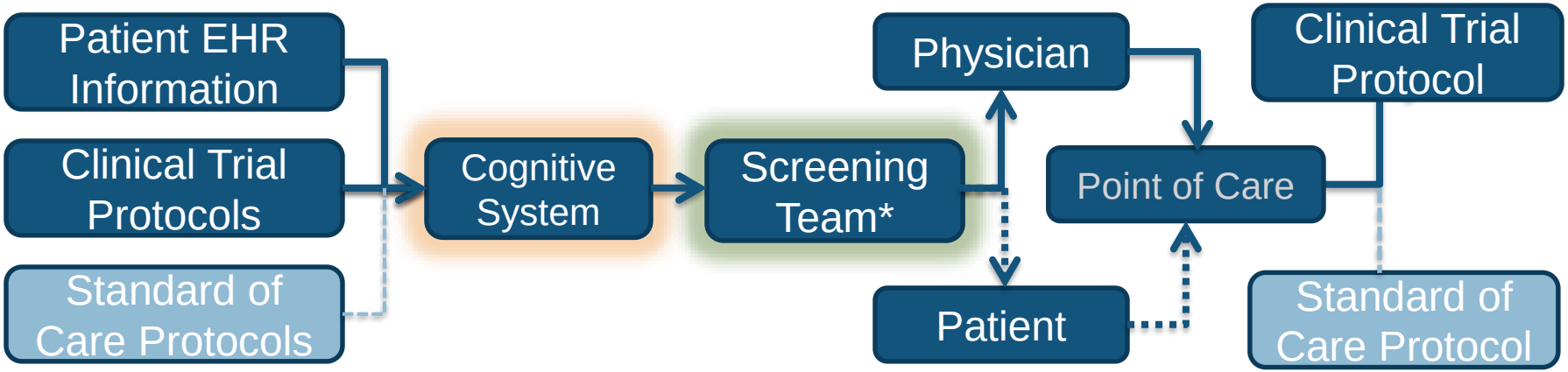
Process Engineering Is Critical

- Prior to use of the cognitive clinical trial matching system
  - Physicians were not routinely screening patients for trials
  - Limited screening resources lacked time and tools to screen at scale
- Placing the system into existing workflows of the physicians ADDED burden to their day – FAILURE ensued
- Revised plan: Worked back from the goal of providing a list of qualified trials in front of the physician for each patient and each visit
  - Engaged a health systems engineer to the project team
  - Workflow redesigned

Quantitative and Qualitative Metrics following system implementation

Increasing Clinical Trial Screening and Matching

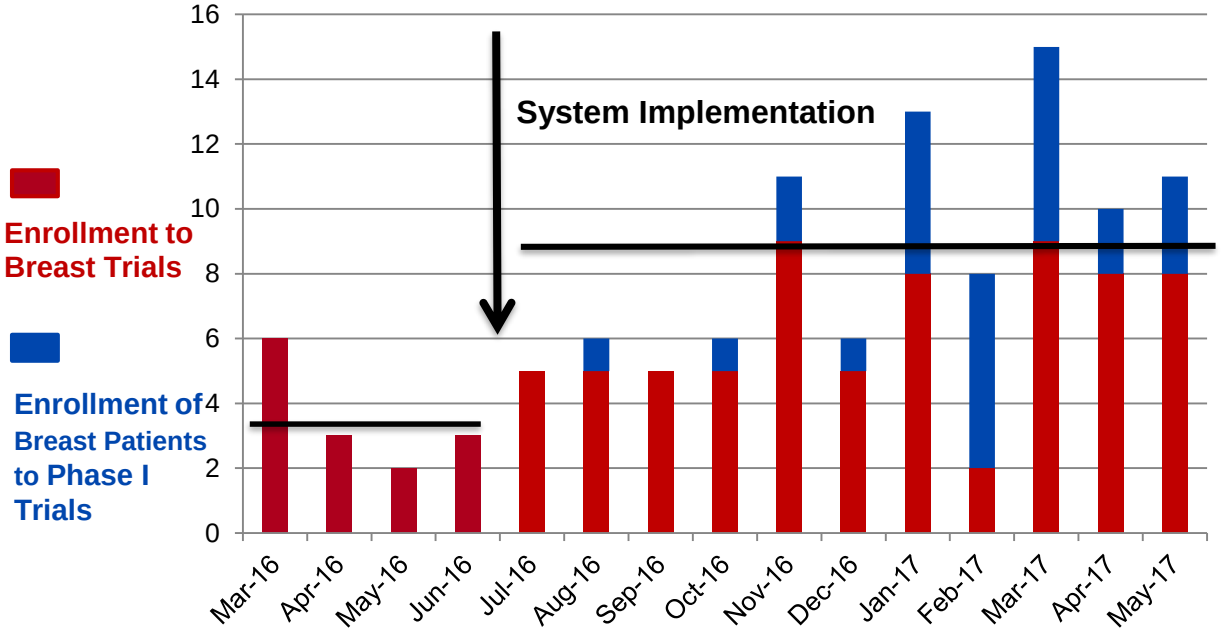
New and Established Patients



Implementation of the cognitive clinical trial matching system into the breast oncology practice

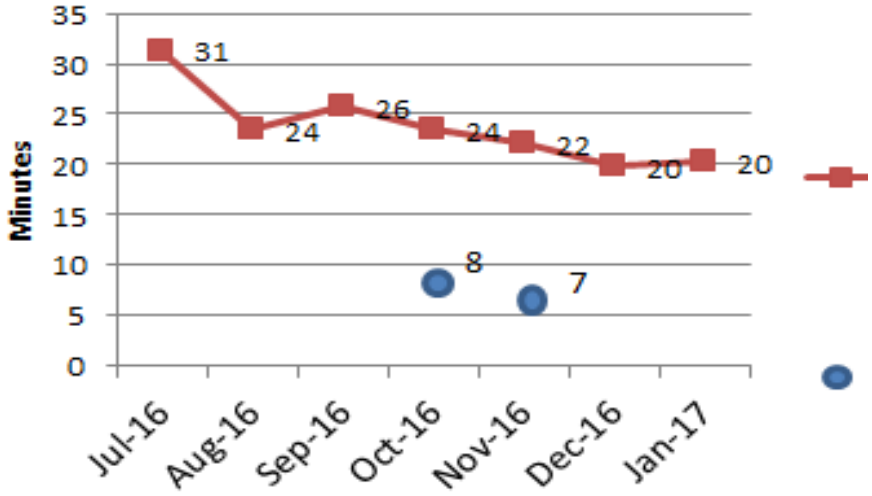
- Practice averages 645 patient visits/mo
- All patients screened for all trials; findings validated on average for 42% of 'high yield' patients
- System derives up to 60 patient and tumor attributes from unstructured data
- The attributes are evaluated across ~ 30 therapy trials with on average 30 inclusion and exclusion criteria for each trial

Increased Enrollment to Breast Cancer Systemic Therapy Trials with a Cognitive Clinical Trial Matching System



- Average 3.5 patients/mo pre-implementation and 6.3 patients/mo post
  80% increase in enrollment
- Further increase to 8.7 patients/mo when including enrollment of breast patients to Phase I trials

Time to Screen a Patient with the System



Process time by coordinators with handoffs

Process time by an experienced research RN without handoffs

Timing Study Conclusions

- Fewer handoffs during the screening process reduces screening time
- Coordinator time to screen improves over time
- Nurses achieved faster screening times compared with coordinators, likely due to enhanced medical knowledge

Qualitative Feedback

Pros

- I'm thinking about future study opportunities for my patients even if it isn't yet time now
- I'm sharing the screening results with my patients
- Patient awareness and interest is increasing

Cons

- I do not want to log into the system (Chrome) even though links to access it were built into the EHR
- Some results were not as relevant at appointments for patients with no evidence of disease undergoing surveillance or survivorship after curative treatment for early stage disease

Qualitative Feedback

Additional information that would be helpful to include with the system and matching results:

- Impact for patient
- The depth of review completed
- Link to additional protocol information or consent form
- Link to coordinator contact information
- Protocol checklist

- Other patient-related information that would improve matching
  - Chronologic list of diagnosis and treatments
  - Previous cancers
  - Comorbidities
  - Patient symptoms and toxicities
  - Family medical history

Pilot with the Clinical Trials Referral Office (CTRO)

Resource to patients external to Mayo with interest in clinical trials

- The CTRO handles approximately 2000 inquiries per year, of which
  - ~20% lead to consultations
    - ~20% participate in a clinical trial
- For 8 weeks, the CTRO coordinators utilized the cognitive clinical trial matching system to screen patients for studies

Patient Engagement & Feedback
CTRO Pilot

Patient Comments

- *This is one of the best experiences she has had in her cancer journey. Everyone was so open and helpful.*
- *You've been so helpful, I can't thank you enough. No one has spent this much time with us.*
- *You're so knowledgeable. Wish I met you years ago. I wish I could give you a hug through the phone. My family is so grateful*.
- *It's exciting listening to you…Bring hope*.

Lessons Learned

Challenges working with a cognitive system

- Case volume is necessary
  - *To teach and train the system*
  - *To gain the 'learning' benefits*
- Teach and train cycles are time and resource consuming
  - *Requires a multidisciplinary team of SMEs, health IT and computer science engineers, data abstractors, business analysts*
- System is maturing
  - *Despite being a 'work in progress' we are using it in the clinic and deriving value*
- Surveillance for system accuracy extends beyond initial training
  - *System updates or EHR updates may require retraining*

Challenges working with a cognitive system

- Clinical implementation
  - *Will only be successful with commitment to optimize and potentially re-design existing clinical workflows*
- Scaling the system
  - *Work is needed to expand to new cancers, new aspects of cancer care (surgery, radiation, etc), and new phases of cancer care (prevention, screening, diagnostics, survivorship and symptom control)*

Adoption has been slow but steady

Embracing cognitive computing systems and solutions will require a major shift in the culture of our healthcare system

Benefits of Utilizing a Cognitive System for Clinical Trial Matching

- More patients screened, recruited & registered to clinical trials
  - *Our ultimate goal is to screen all patients for all trials at all clinical encounters and to offer matching results directly to patients*
  - *Ideally patients external to Mayo Clinic can also search our clinical trial offerings*
- Consumes less time and resource to do so
- Reduces clinician clerical and cognitive burden
- The system handles unstructured text well and derives valuable clinical information
  - *Patient synopsis acquired in a single click*
  - *Derived information could be re-purposed beyond trial matching*
- Teach and train cycles are taking less time, over time
- Appreciated by staff and patients

Changing Health Through the Power of Cognitive

"Real knowledge is to know the extent of one's ignorance." *Confucius*

"When you know better you do better." *Maya Angelou*

Cognitive Computing Systems in Healthcare

- Represent new solutions and platforms for knowledge management
- Require multidisciplinary teams for successful development
- Require expert training and provider utilization to establish adoption & trust
- Will serve as the foundation of our healthcare models and the future of healthcare delivery

Acknowledgments

Questions and Discussion