David A. Dorr, MD, MS (dorrd@ohsu.edu)
Assistant Professor, Oregon Health & Science University
Department of Medical Informatics & Clinical Epidemiology (caremanagementplus.org)

Education: Economics, Math, Psychology –> Medicine (Washington University in St. Louis)

Medical Informatics / Health Services Administration (University of Utah)

My work focuses on redesigning health systems, including health information technology, to provide higher quality, safer, more satisfying care.

Managing and Coordinating Health Care: Creating Collaborative, Proactive Systems

David A. Dorr, MD, MS (dorrd@ohsu.edu)

Assistant Professor, OHSU

Department of Medical Informatics & Clinical Epidemiology

www.caremanagementplus.org

CM+ care management plus

THE JOHN A. HARTFORD FOUNDATION 1929

OREGON HEALTH&SCIENCE UNIVERSITY OHSU

Intermountain℠ Healthcare

About me and quick definitions

Me: Internist / Medical Informatics / Quantitative

Definitions

- Primary care provider: whomever gives you ongoing, comprehensive care (your family doctor, internist, pediatrician, or gynecologist)
- Primary care team: at least a provider + medical assistant, and sometimes (if you need them) a care manager nurse, social worker, pharmacist, etc …
- Care management: system to make treatment plans and processes consistent / reliable / appropriate to evidence and patient preference
- Care coordination: reconciling and prioritizing plans of care across settings and teams

Case study

Ms. Viera

a 75-year-old woman

with diabetes,

systolic hypertension,

mild congestive heart failure,

arthritis and

recently diagnosed dementia.

Ms. Viera and her caregiver come to clinic with several problems, including

1. hip and knee pain,
2. trouble taking all of her current 12 medicines,
3. dizziness when she gets up at night,
4. low blood sugars in the morning, and
5. a recent fall.

Ms. Viera's office visit

And Out in the hall:

6. The caregiver confidentially notes he is exhausted
7. money is running low for additional medications.

How can Dr. Smith and the primary care team handle these issues?

Simple heuristics won't work: they don't capture the complexity. However, there must be a way ...

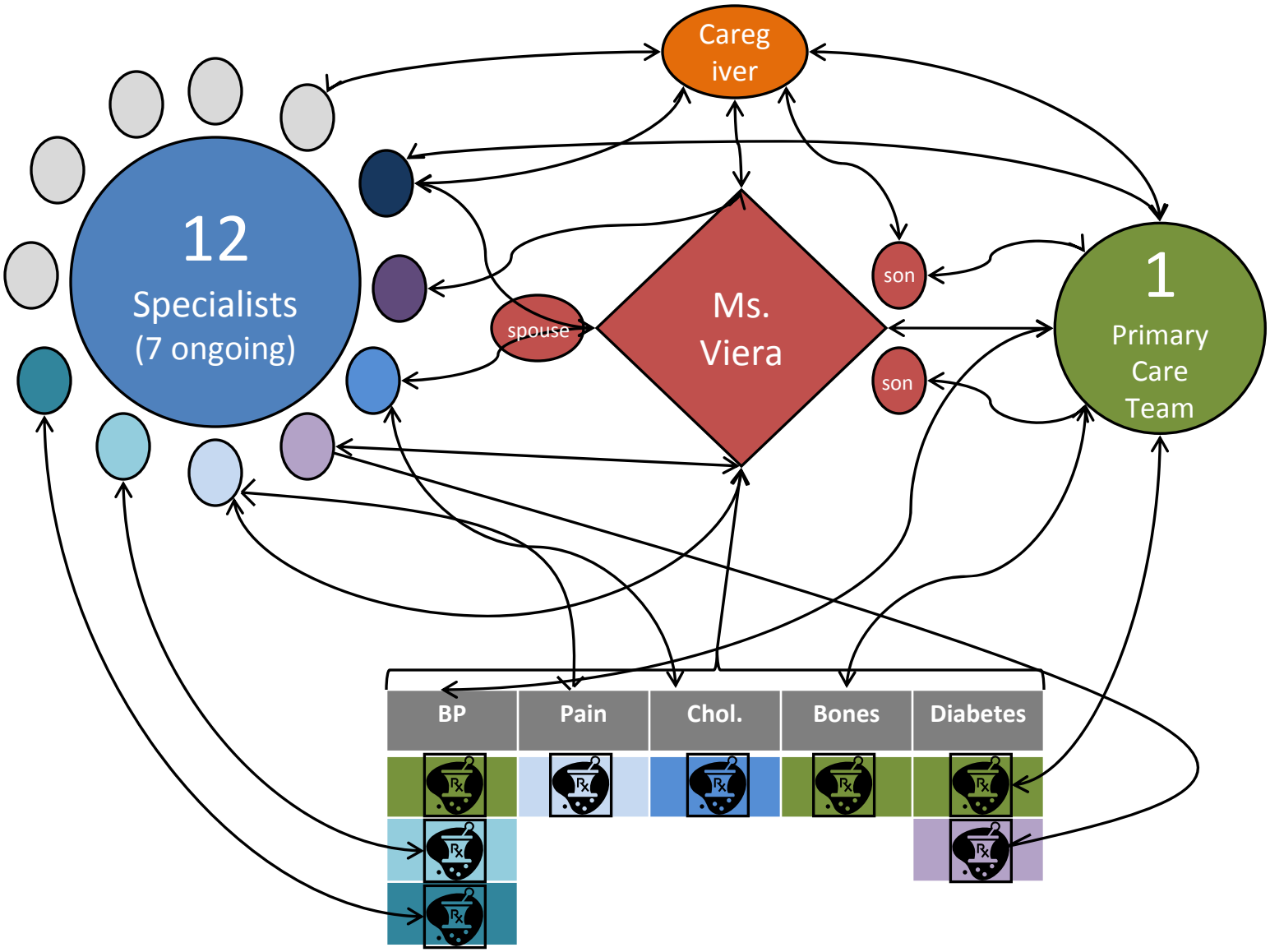
Past: Heroism in the face of multiple illnesses

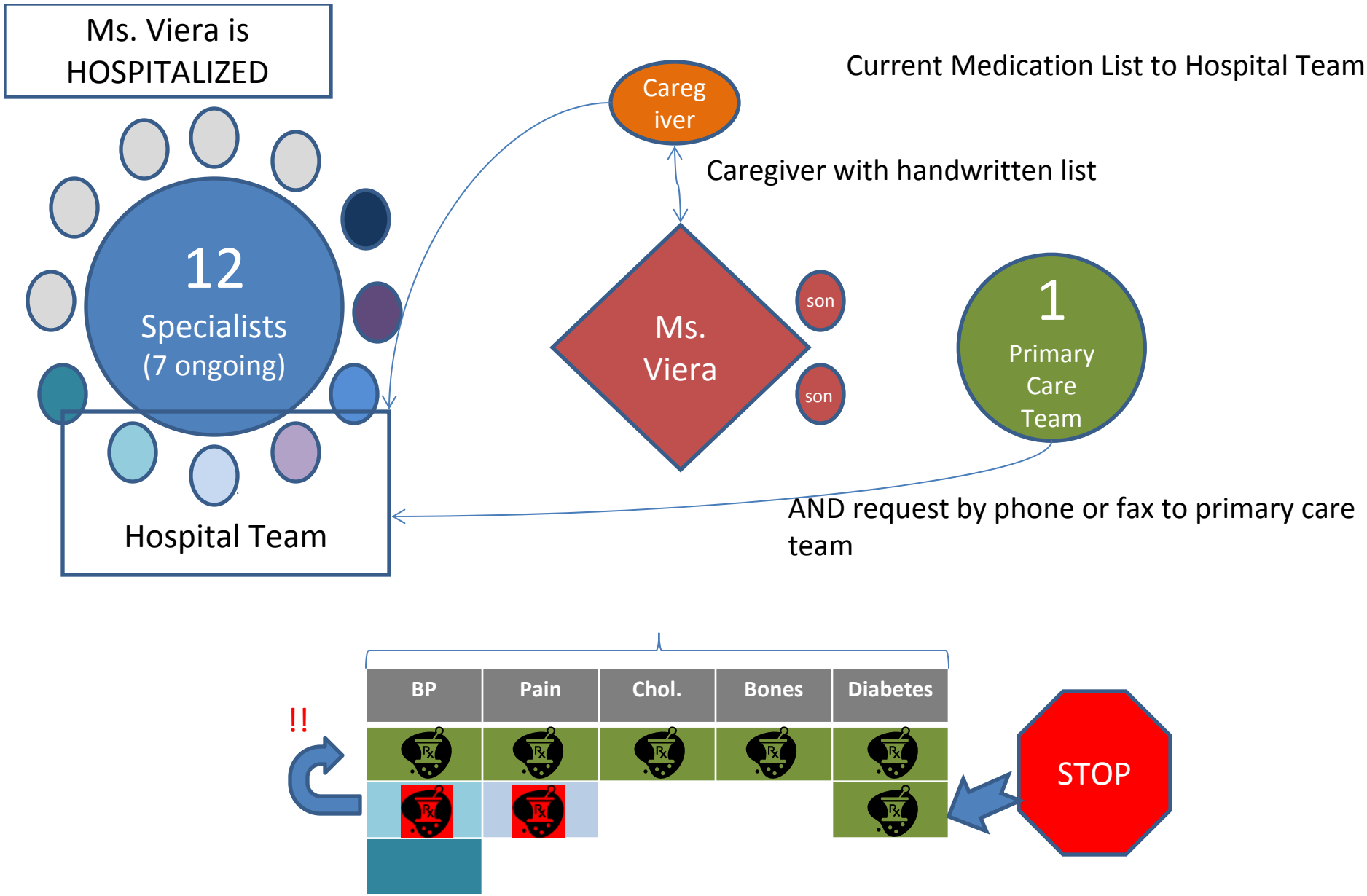
- Multiple diseases increase risk and coordination *logarithmically* (5+ : 90 x risk of hospitalization; 10x prescriptions; 13 providers vs. 2)
- To manage preventive and chronic illnesses in a primary care panel: 23 hours a day
- Patients with multiple illnesses *better* process quality scores but *worse* 'preventable' hospitalizations

Bodenheimer, JAMA;C. Boyd, JAMA; Wolff, JAGS; Dorr, JAGS

The system of usual care coordination: neither proactive nor collaborative.

Event	System1 : usual care
Ms. Viera is hospitalized.	Courtesy call made to PCP.
Month 1: Ms. Viera goes home. An appointment is planned with her PCP for follow-up.	Ms. Viera receives sheet with the instructions to make an appointment; PCP receives a fax in 7 days with discharge info.
Month 2: Ms. Viera resumes usual activities and becomes dizzy in the morning	She calls the PCP, an appointment is scheduled, but she goes to the ED due to worsening symptoms.
Month 3: Adjustments to medications are made by 3 specialists.	2 of 3 send reports to the PCP office with plan; these reports are duly filed. When seen by the PCP, she can't remember these changes.
Month 6: Ms. Viera has chest pain and calls her PCP for help.	PCP sees patient urgently; BP is out of control and Ms. Viera is hospitalized for observation.
Month 12: Review of the year for Ms. Viera and family	After her second hospitalization, she is discharged to rehabilitation and a skilled nursing facility.


Careg
iver
12
Specialists
(7 ongoing)
spouse
Ms.
Viera
son
son
1
Primary
Care
Team
BP
Pain
Chol.
Bones
Diabetes


Ms. Viera is HOSPITALIZED
Careg iver
Current Medication List to Hospital Team
Caregiver with handwritten list
12
Specialists
(7 ongoing)
Ms. Viera
son
son
1
Primary Care Team
Hospital Team
AND request by phone or fax to primary care team
BP
Pain
Chol.
Bones
Diabetes
!!
STOP

Ms. Viera is DISCHARGED

Care plan back to patient and Primary Care

Careg iver

Caregiver with handwritten list !!

12 Specialists (7 ongoing)

Ms. Viera

son

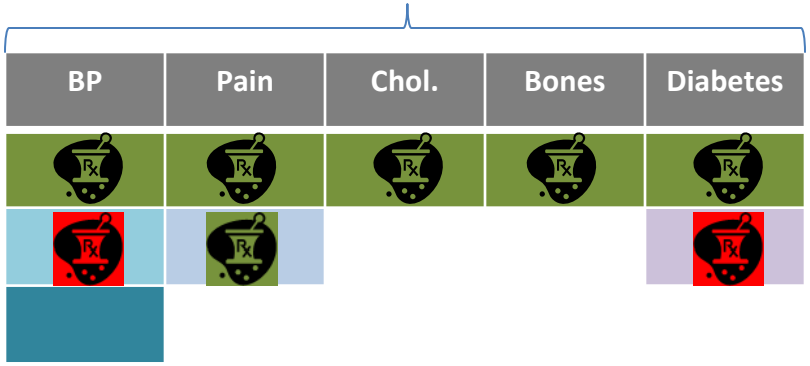
son

1 Primary Care Team

Handwritten discharge form

Hospital Team

Faxed discharge summary to Primary Care;
Call if Hospital Team exceptional
Discharge summary: +7 days; Appt time +3 days



Ms. Viera DEVELOPS SYMPTOMS

ED needs immediate treat decision

Careg iver

ED Team

Caregiver with handwritten list !!

12 Specialists (7 ongoing)

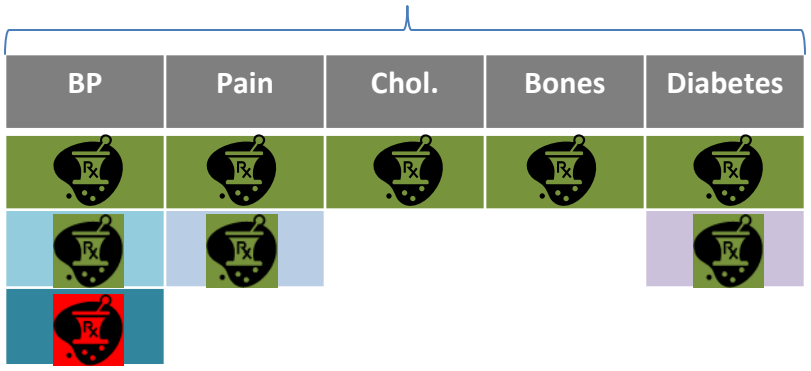
Ms. Viera

son

son

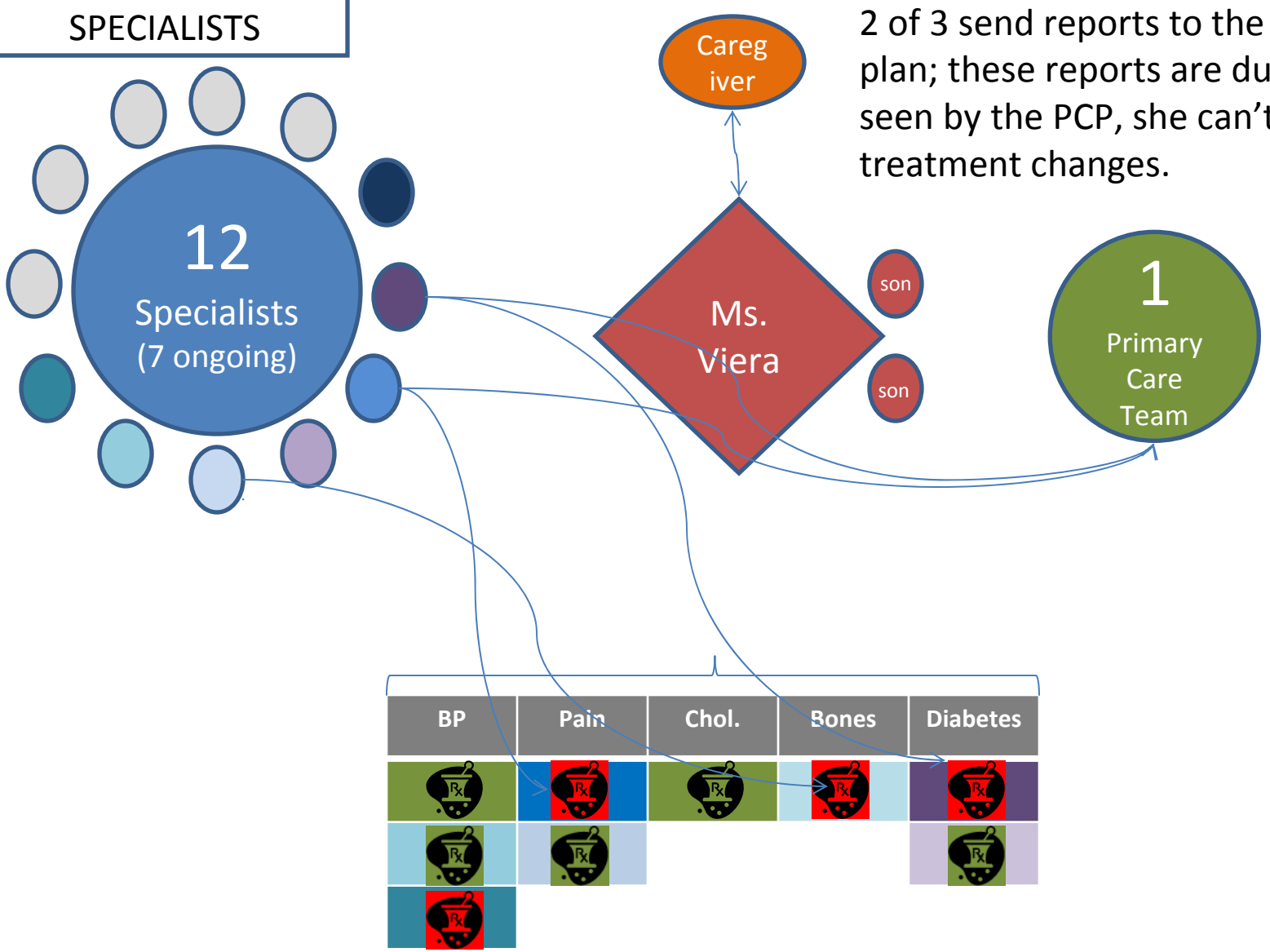
1 Primary Care Team

Call on-call physician for practice –
Is Electronic Health Record list up to date?



OUTCOME: (RE)Hospitalization due to system failure

Ms. Viera SEES 3 SPECIALISTS



2 of 3 send reports to the PCP office with plan; these reports are duly filed. When seen by the PCP, she can't remember treatment changes.

Problems identified with the old system

- Lack of collaboration between patient/family and health care team
- Lack of reliable, completed communication
  - 50% of the time ...
    - Patients don't understand the plan
    - Can't identify what was communicated
    - Don't feel included in the plan
- Failure to prioritize needs

On to the future

Complex Adaptive System (CAS)

A dynamic network of agents who constantly act and react to one another. Control is distributed among agents who, through their decisions based on competition and cooperation, produce emergent behavior of a system.

-John Holland (paraphrased)

1) order is emergent as opposed to predetermined
2) the system's history is irreversible, and
3) the system's future is often unpredictable.

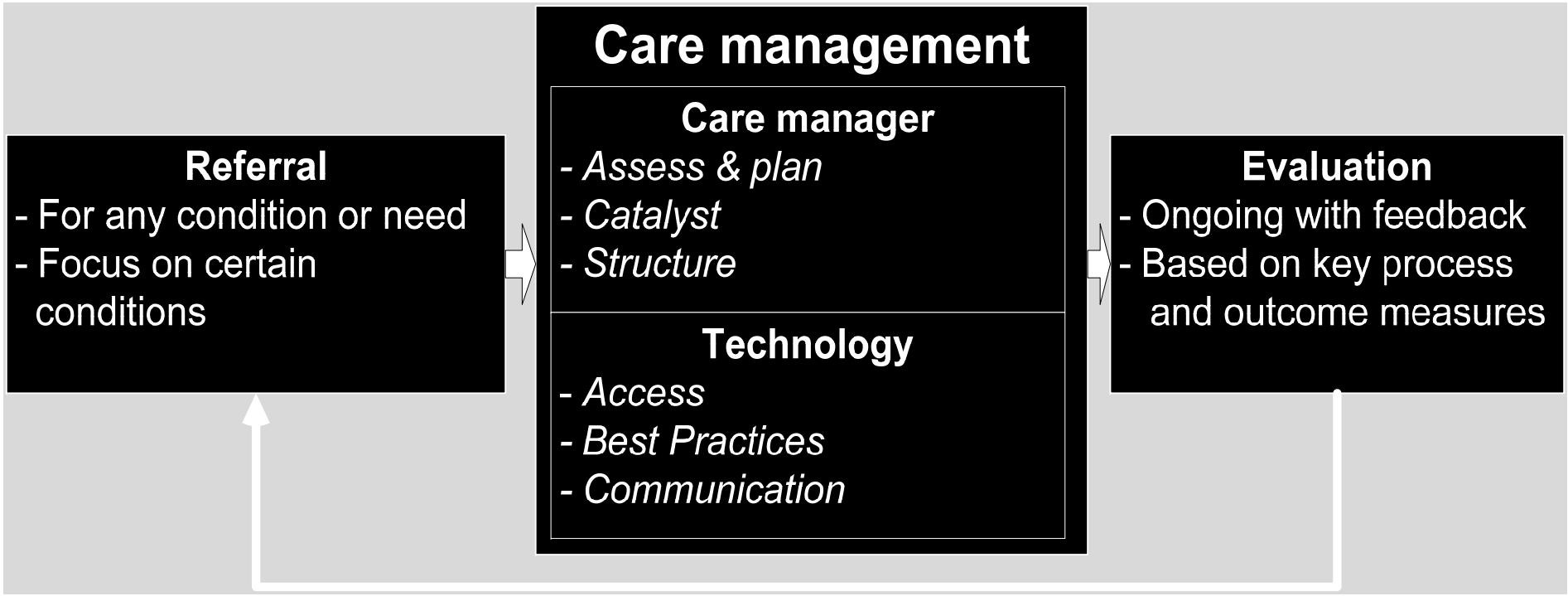
Complexity: the emerging science at the edge of order and chaos. Harmondsworth [Eng.]: Penguin. 1994.

Data gathering and lessons

- Crew Resource Management: redesigning interaction for better decision-making and information flow
- Distributed cognition: representations of information and process by which they are coordinated
- So we asked, iterated, asked again, and developed two basic ideas:
  - A new **agent** was needed : care manager
  - **Information technology** needed to be focused at better representation and prioritized distribution

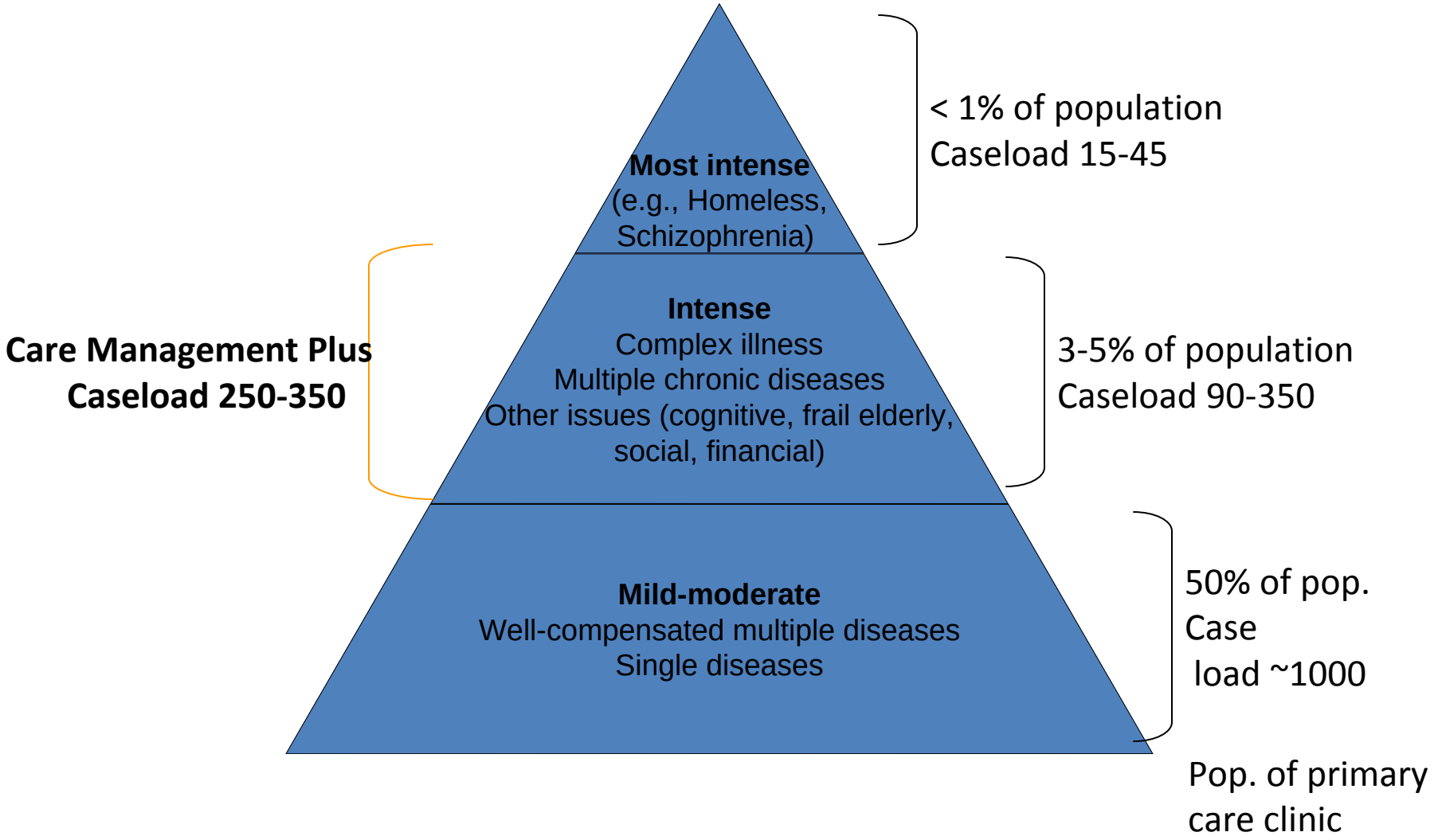
Ambulatory Care Management / Care Coordination: CM+

In >75 primary care clinics



Leads to improvements in patient satisfaction, disease control and…

Team-based Care management varies by intensity and function for different populations and needs.



TEAM PREPARATION

The right people on the team with the right training is a core principle.

Patients are taught to self-manage and have a **guide** through the system.

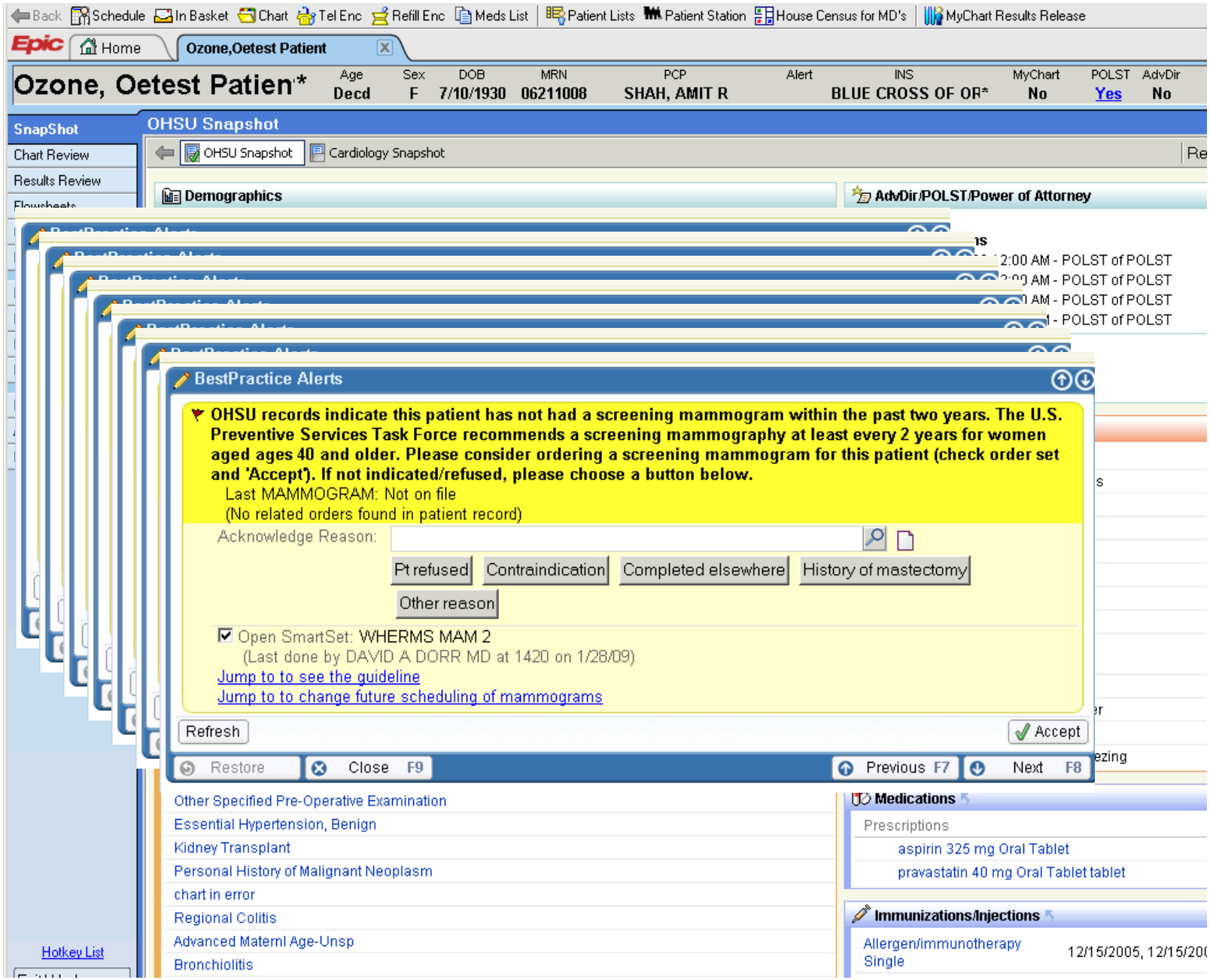
Care managers receive special training in

- Education, motivation/coaching
- Disease specific protocols
- Care for seniors / Caregiver support
- Connection to community resources

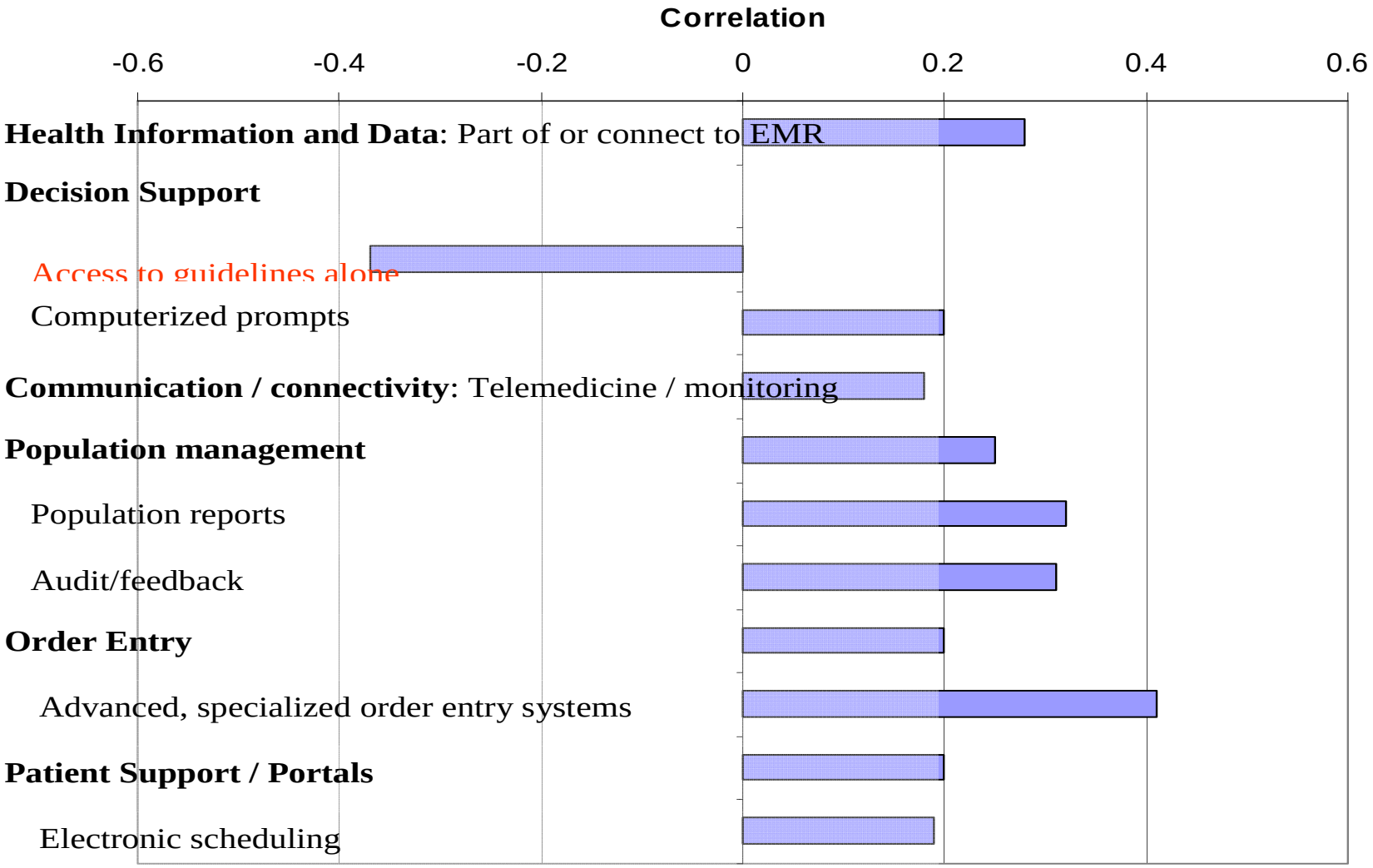
Providers / Other staff:

- Need to participate in protocol development/ implementation / adaptation
- Need to learn about care management (usually from the care managers)

HIT must be redesigned



Improved HIT for chronic illness



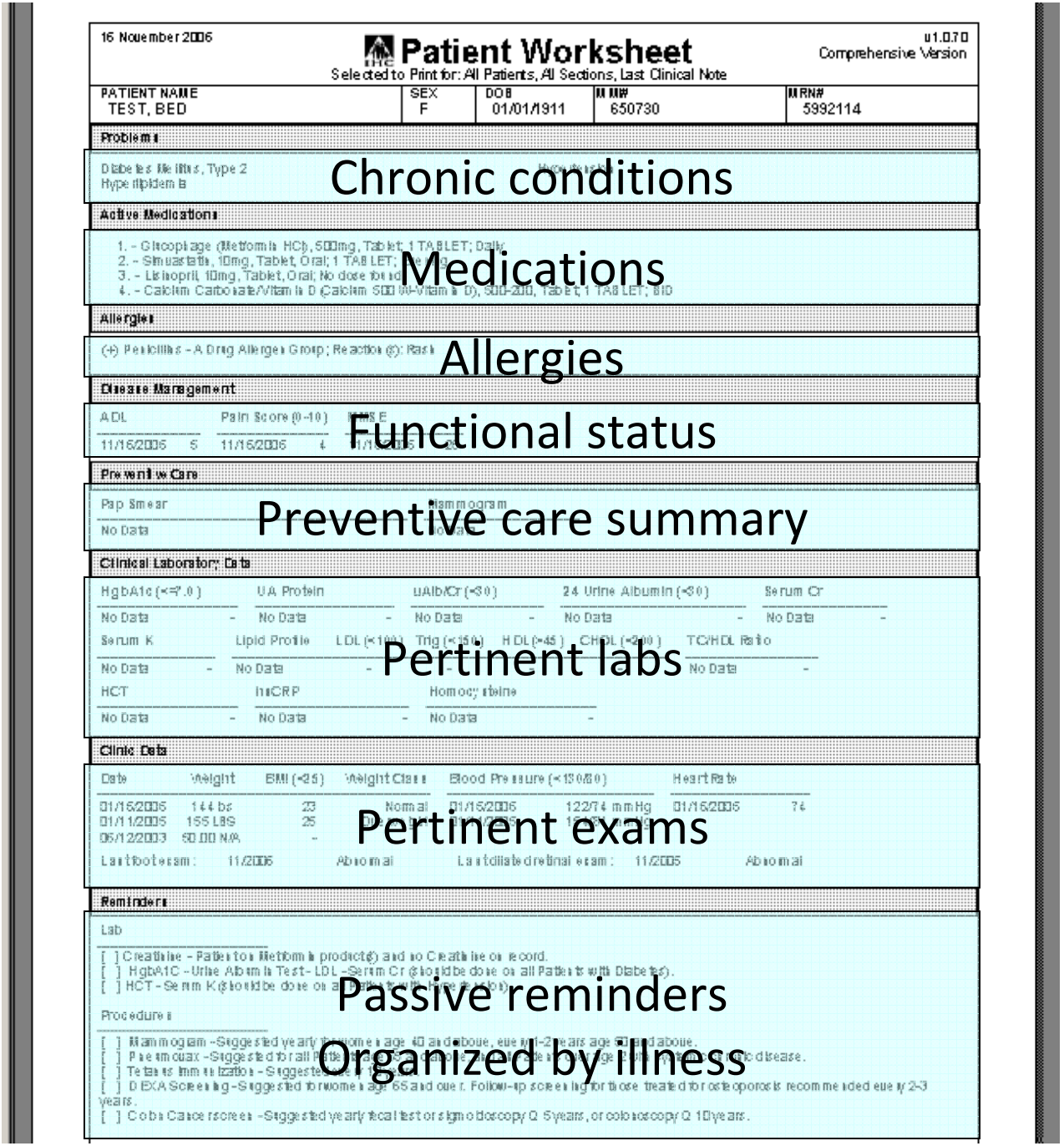
Creating HealtheVet Informatics Applications for Collaborative Care (CHIACC)

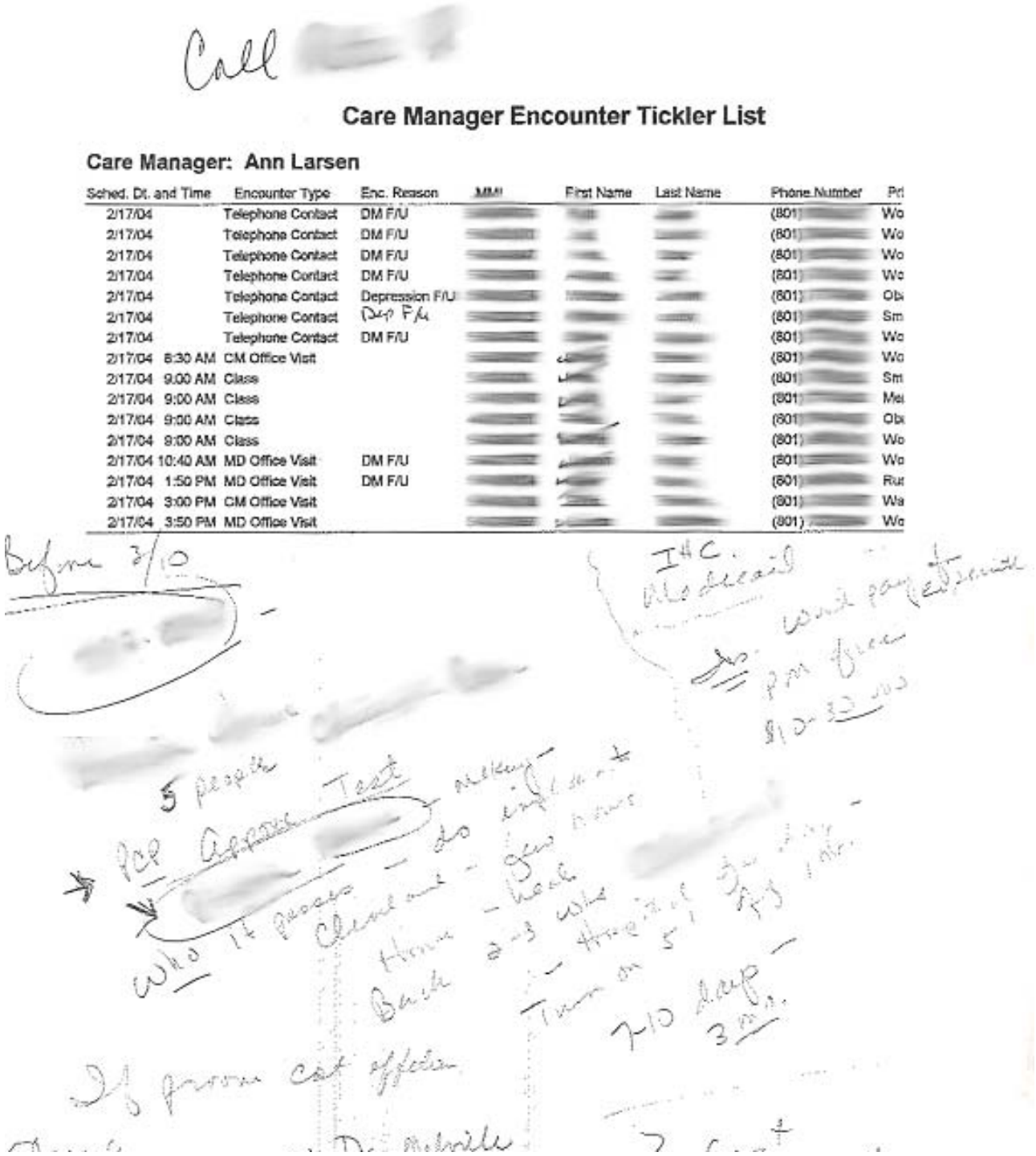
How can HIT help the redesign of care for Ms. Viera?

- Collaboration
  - Sharing information / interoperability
  - Explaining and aiding in decision making
- Communication
  - Close the loop BUT not overwhelm recipient
- Adapt
  - ‘Next step’ is usually only one to enforce
- Prioritization

Health Information summary sheet

Wilcox, Proc of AMIA Symp, 2005





Call [redacted]

Care Manager Encounter Tickler List

Care Manager: Ann Larsen

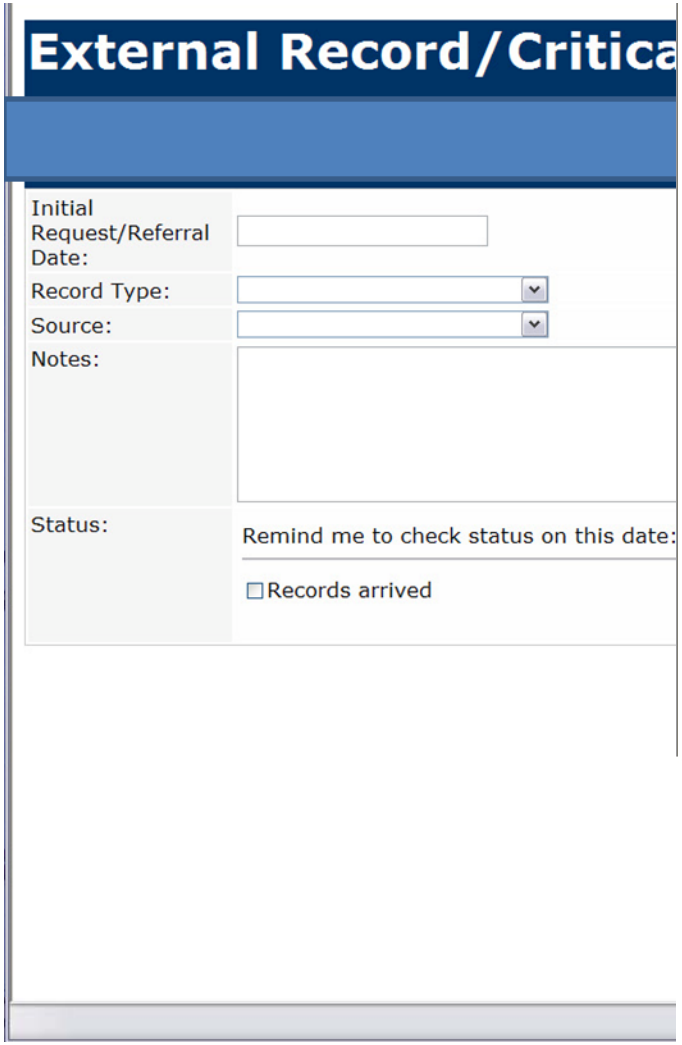
Sched. Dt. and Time	Encounter Type	Enc. Reason	MMI	First Name	Last Name	Phone Number	Pri
2/17/04	Telephone Contact	DM F/U	[redacted]	[redacted]	[redacted]	(801) [redacted]	Wo
2/17/04	Telephone Contact	DM F/U	[redacted]	[redacted]	[redacted]	(801) [redacted]	Wo
2/17/04	Telephone Contact	DM F/U	[redacted]	[redacted]	[redacted]	(801) [redacted]	Wo
2/17/04	Telephone Contact	DM F/U	[redacted]	[redacted]	[redacted]	(801) [redacted]	Wo
2/17/04	Telephone Contact	Depression F/U	[redacted]	[redacted]	[redacted]	(801) [redacted]	Ob
2/17/04	Telephone Contact	Dep F/u	[redacted]	[redacted]	[redacted]	(801) [redacted]	Sm
2/17/04	Telephone Contact	DM F/U	[redacted]	[redacted]	[redacted]	(801) [redacted]	Wo
2/17/04 8:30 AM	CM Office Visit		[redacted]	[redacted]	[redacted]	(801) [redacted]	Wo
2/17/04 9:00 AM	Class		[redacted]	[redacted]	[redacted]	(801) [redacted]	Sm
2/17/04 9:00 AM	Class		[redacted]	[redacted]	[redacted]	(801) [redacted]	Me
2/17/04 9:00 AM	Class		[redacted]	[redacted]	[redacted]	(801) [redacted]	Ob
2/17/04 9:00 AM	Class		[redacted]	[redacted]	[redacted]	(801) [redacted]	Wo
2/17/04 10:40 AM	MD Office Visit	DM F/U	[redacted]	[redacted]	[redacted]	(801) [redacted]	Wo
2/17/04 1:50 PM	MD Office Visit	DM F/U	[redacted]	[redacted]	[redacted]	(801) [redacted]	Ru
2/17/04 3:00 PM	CM Office Visit		[redacted]	[redacted]	[redacted]	(801) [redacted]	Wa
2/17/04 3:50 PM	MD Office Visit		[redacted]	[redacted]	[redacted]	(801) [redacted]	Wo

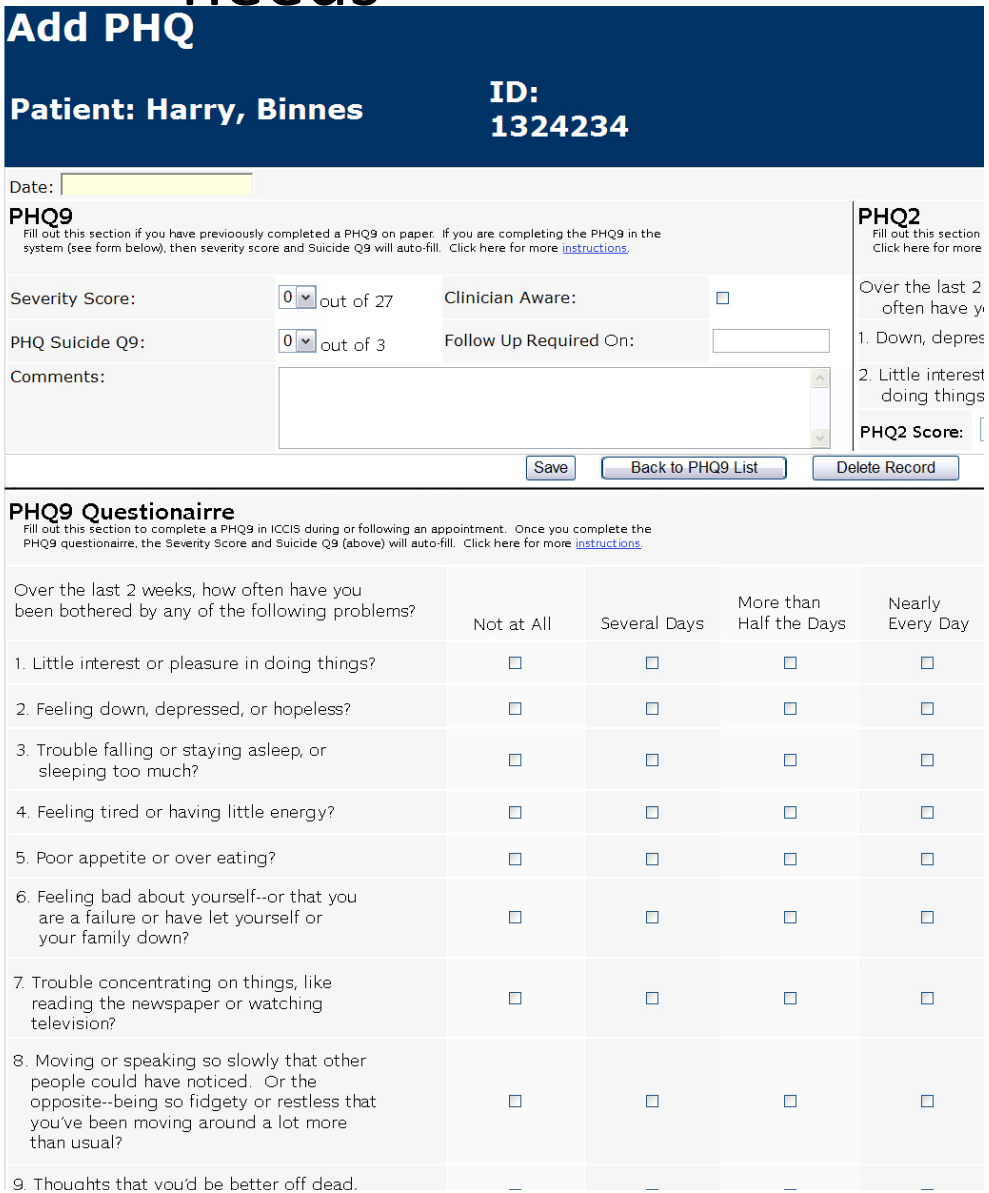
Population Tickler

Remind about communication tasks

Facilitate the nuts and bolts of teamwork

Specific elements address care coordination needs

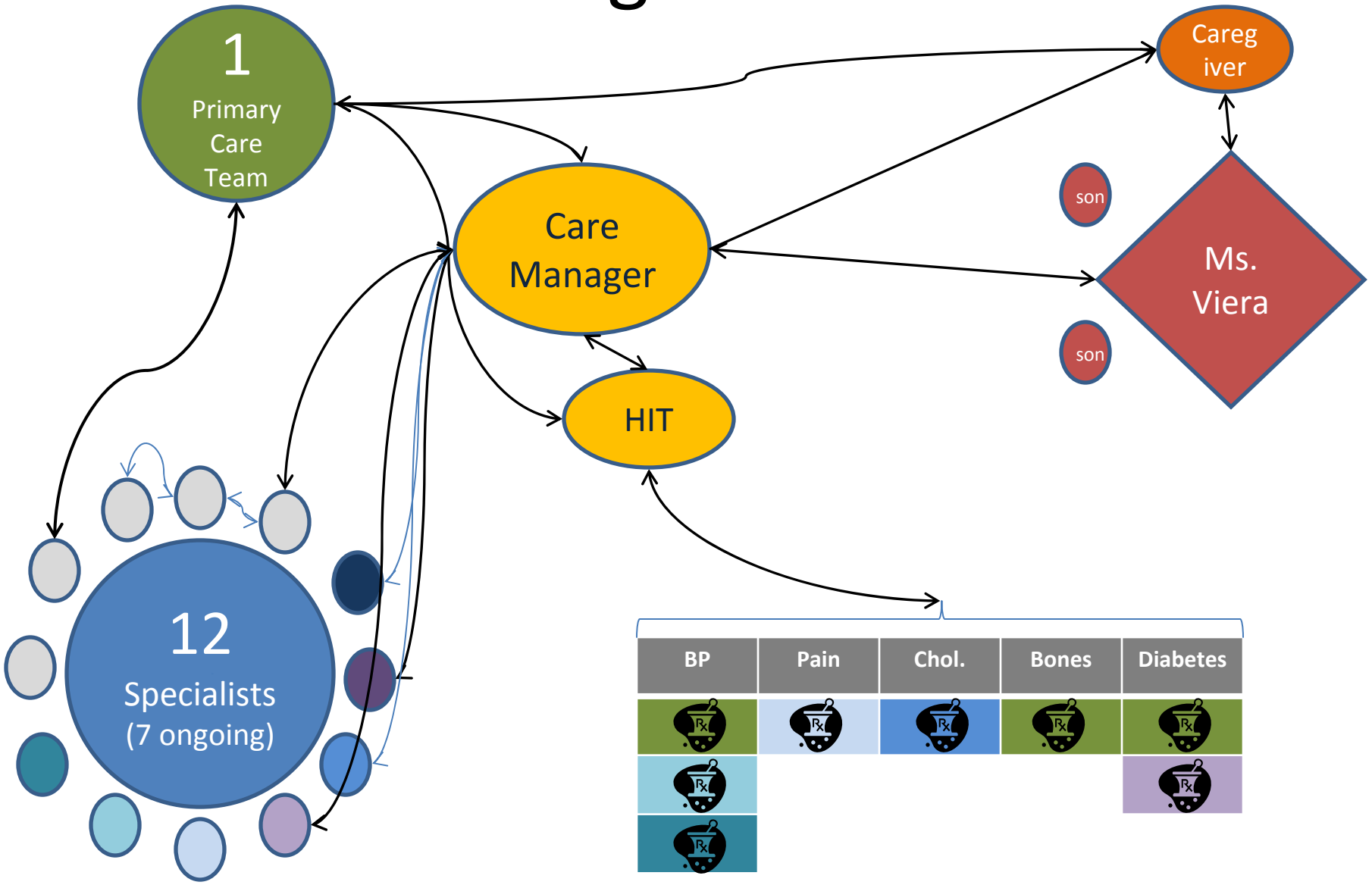


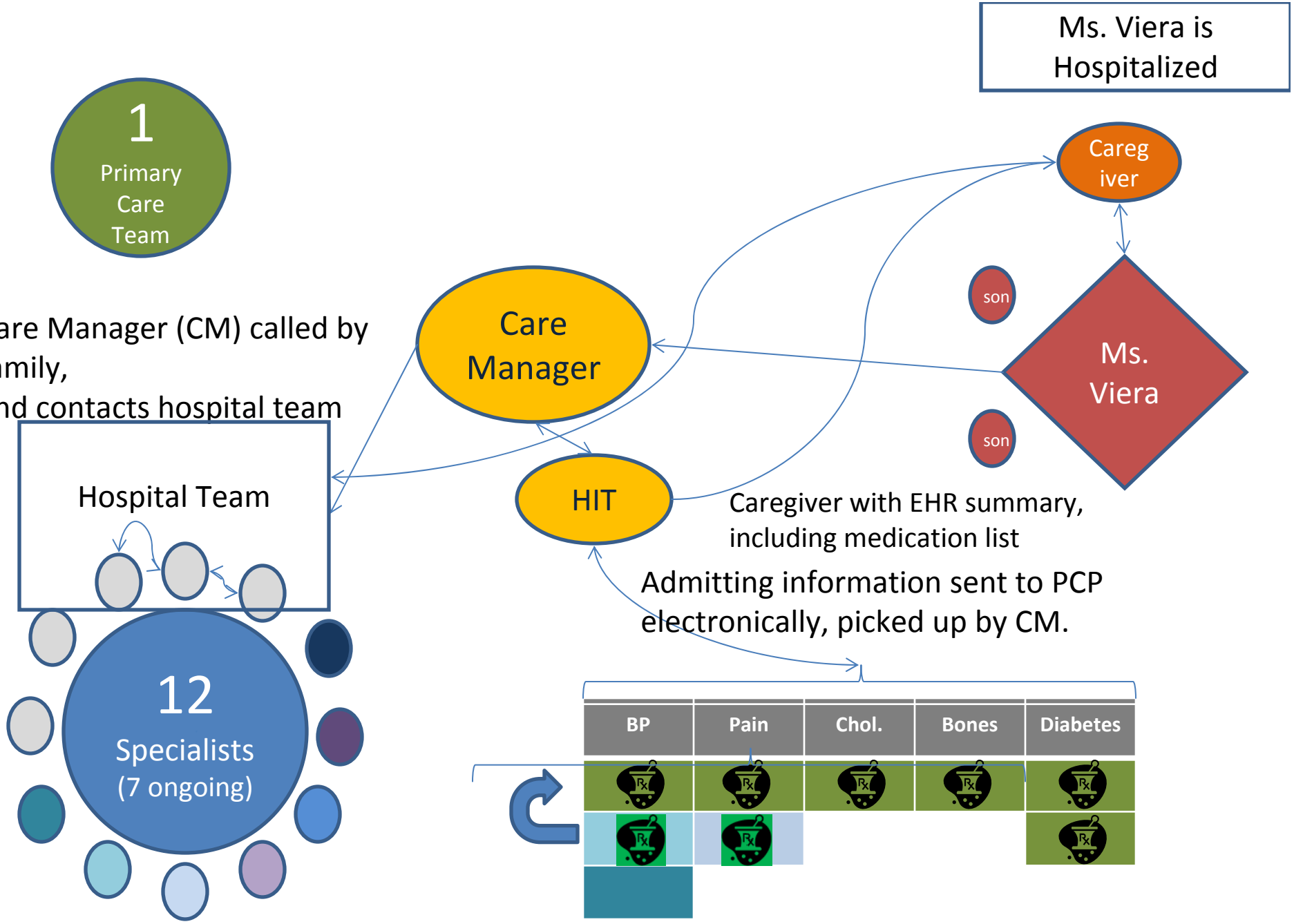


A more advanced system

Event	System2a: High care coordination	System2b: High health information technology
Ms. Viera is hospitalized.	Care Manager (CM) called by family.	Admitting information sent to PCP, picked up by CM.
Month 1: Ms. Viera goes home. An appointment is planned with her PCP for follow-up.	CM assures appointment made and calls 2-4 days post-hospitalization. CM attends PCP visit.	Scheduled outreach for follow-up tracked per protocol and CM need; these remain until communication completed.
Month 2: Ms. Viera resumes usual activities and becomes dizzy in the morning	CM takes call, and has patient come in per provider advice; low blood sugars are to blame and medications adjusted.	Blood sugars are tracked over time in the system, with regular follow-up calls scheduled as medications adjusted.
Month 3: Adjustments to medications are made by 3 specialists.	On monthly review by CM, Ms. Viera brings in her medications and notes changes. The medication list is updated.	Specialist referrals deemed critical are tracked by system and missing report causes a reminder to be triggered.
Month 6: Ms. Viera has chest pain and calls her PCP for help.	Under a CM protocol, her BP was controlled and she is seen, stabilized, and returned home.	Protocols are enforced by system, with reminders about patient goals and follow-up.
Month 12: Review of the year for Ms. Viera and family	With Ms. Viera's permission, the daughter comes in for a conference, and helps arrange to keep Ms. Viera at home.	A summary generated by the system helps inform the conference and aids in care planning.

How might it work?




Ms. Viera is Hospitalized
1
Primary Care Team
Careg iver
son
Ms. Viera
son
Care Manager
Care Manager (CM) called by family,
and contacts hospital team
Hospital Team
HIT
Caregiver with EHR summary, including medication list
Admitting information sent to PCP electronically, picked up by CM.
12
Specialists
(7 ongoing)
BP
Pain
Chol.
Bones
Diabetes

Ms. Viera is DISCHARGED

1 Primary Care Team

Careg iver

son

son

Ms. Viera

Care Manager

CM assures appointment made and calls 2-4 days post-hospitalization. CM attends PCP visit.

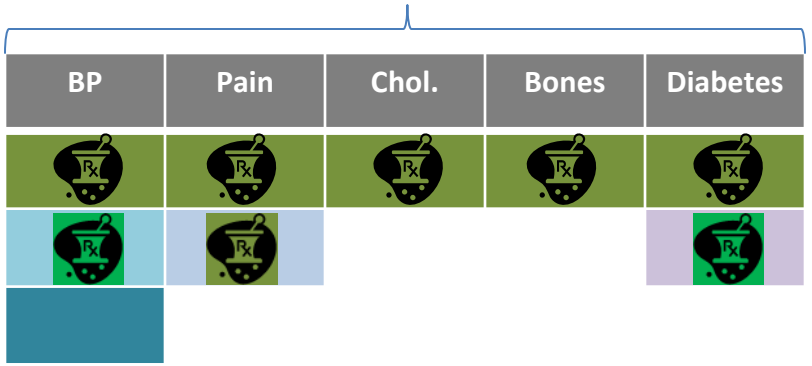
Hospital Team

Written Discharge instructions

HIT

12 Specialists (7 ongoing)

Scheduled outreach for follow-up tracked per protocol and CM need; these remain until communication completed.



Medications reconciled at discharge and in visit

Ms. Viera HAS SYMPTOMS

1
Primary Care Team

& Calls primary care: CM takes call, and has patient come in per provider advice; low blood sugars are to blame and medications adjusted.

Careg iver

son

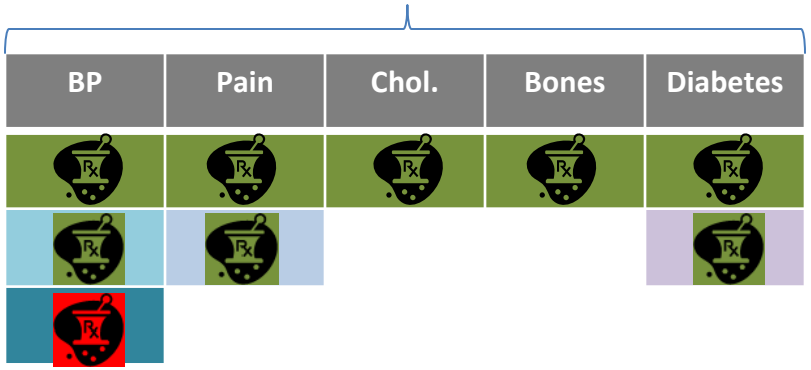
Ms. Viera

son

Care Manager

HIT

12
Specialists
(7 ongoing)



Ms. Viera SEES 3 SPECIALISTS

1 Primary Care Team

Careg iver

son

son

Ms. Viera

Care Manager

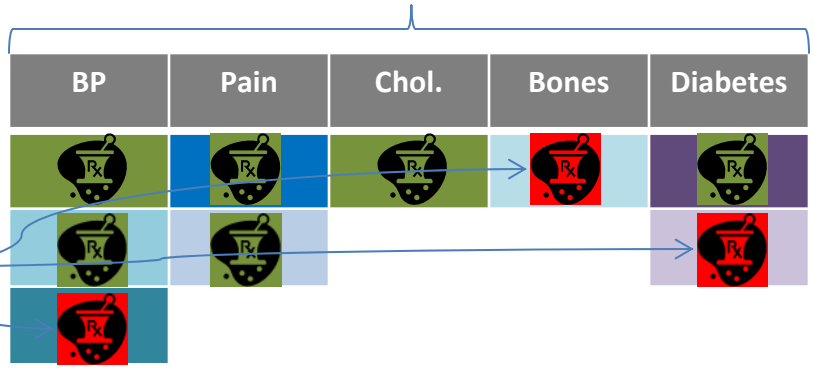
HIT

On monthly review by CM, Ms. Viera brings in her medications and notes changes. The medication list is updated.

Specialist referrals deemed ***critical*** are tracked by system and missing report causes a reminder to be triggered.

12 Specialists (7 ongoing)

!!!!



Fortunately, we have more than theory

- Pilot study in 7 intervention clinics (install care manager, train, improve IT over 2 years) vs. 6 control (no care manager)
- Measure death, hospitalizations, efficiency over 3 years in thousands of patients

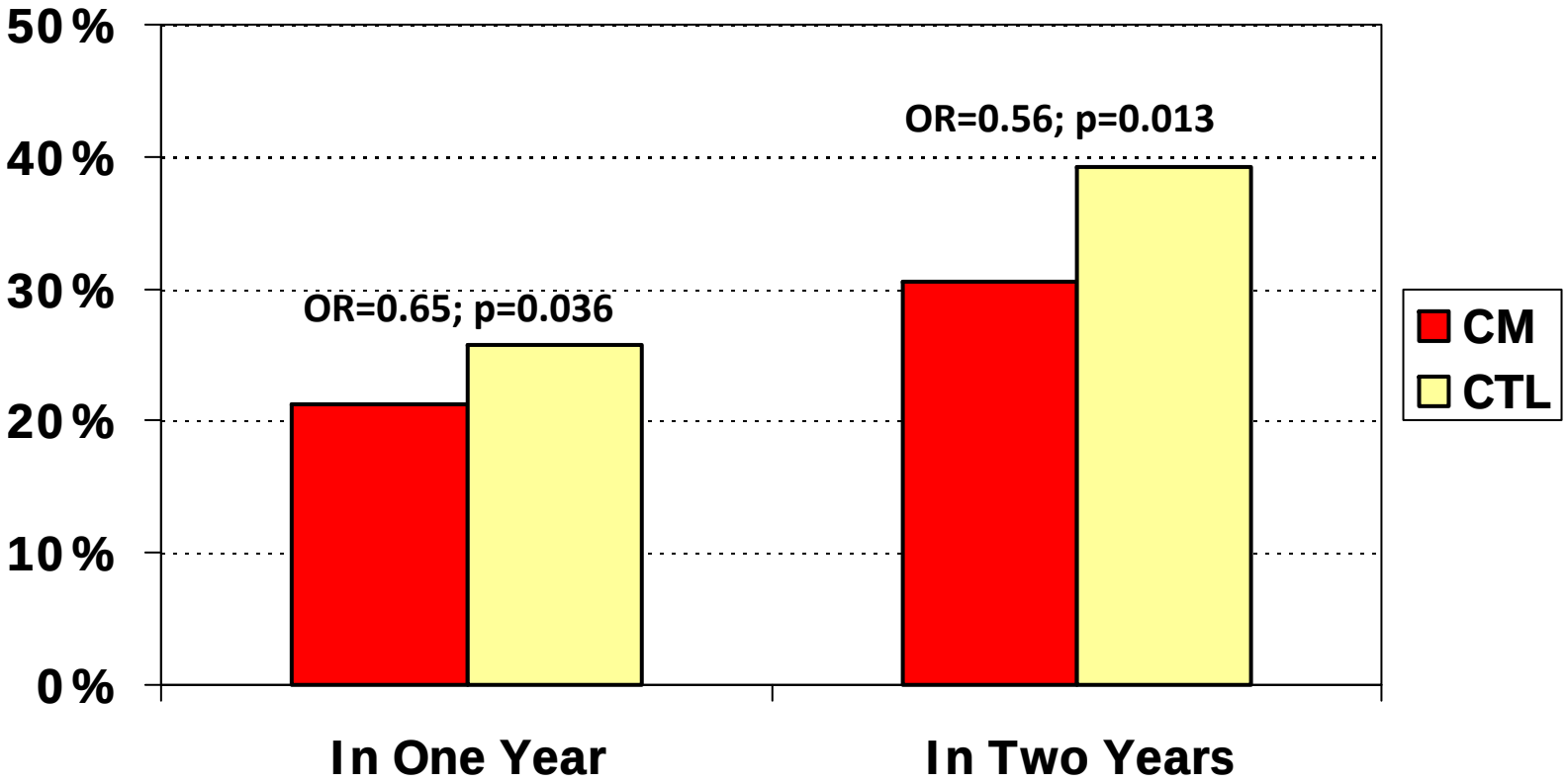
How does it work?

In CM+, Odds of dying were reduced significantly.

Variable	Time	CM+	Control	Difference
All Patients		(N=1,144)	(N=2,288)	
	at 1 year	6.5%	9.2%	-2.7%
Deaths	at 2 years	13.1%	16.6%	-3.5%
Multiple illnesses		(N=557)	(N=1114)	
	at 1 year	6.2%	10.6%	-4.4%
Deaths	at 2 years	12.9%	18.2%	-5.3%

Dorr, JAGS, 2008

Reduction in hospitalizations from CM+



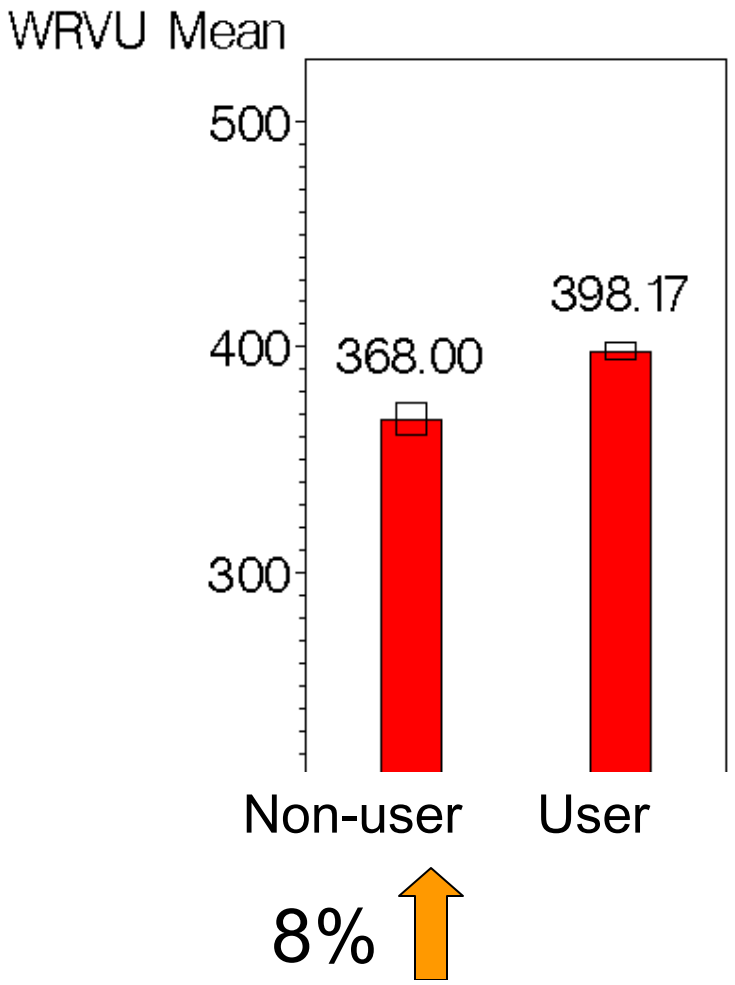
Dorr, JAGS, Dec 2008

Physicians were more efficient through better documentation, a slight increase in visits, and a change in practice pattern.

- Physicians who referred to care managers:

8% more productive

- Than peers in same clinic



Dorr, AJMC, 2007

Lessons and conclusion

- Assume nothing
- Complexity, for us, required manual prioritization and adaptation
- Communication tasks quickly become overwhelming without the HIT
  - Team – including the patient!
  - Care Planning with priorities
- The system requires distributed cognition over time to work

Next steps

- We are just discovering how to capture the prioritization and metrics : now we need better algorithms
- Solving HIT design and information flow through next generation systems
- Creating collaborative redesign through our clinic networks
- Understanding impact on health policy

Thanks! The Care Management Plus Team

- OHSU
  - David Dorr, MD, MS
  - K. John McConnell, PhD
  - Kelli Radican
  - Gwen Olsen
  - Marsha Pierre-Jacques Williams
  - Nima Behkami
  - Molly King
- Intermountain Healthcare
  - Cherie Brunker, MD
  - Liza Widmier
  - Mary Carpenter

Advisory board

- Tom Bodenheimer
- Steve Counsell
- Eric Coleman
- Cheryl Schraeder
- Heather Young

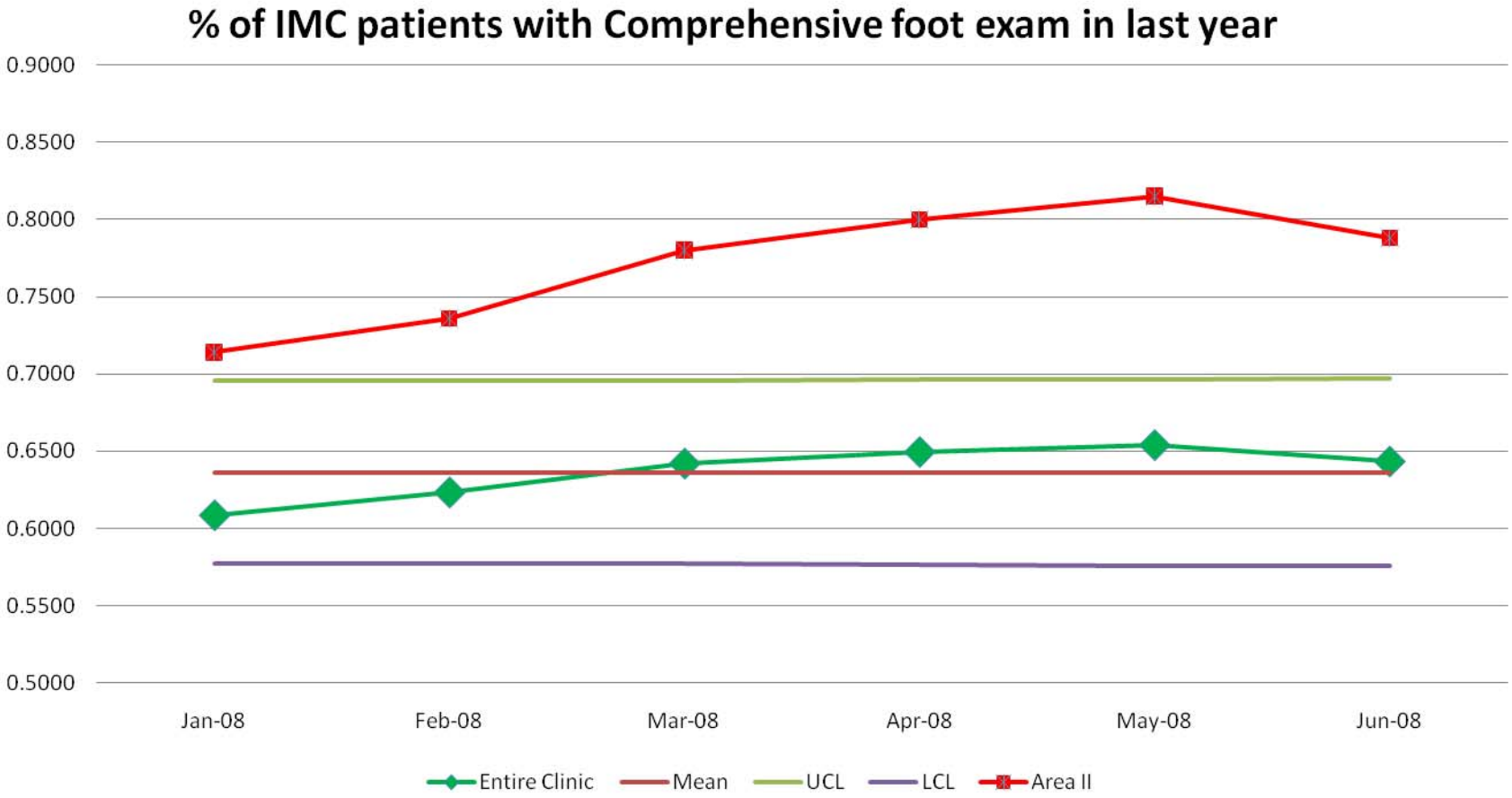
Informatics

- Adam Wilcox, PhD

Technology and materials @ caremanagementplus.org

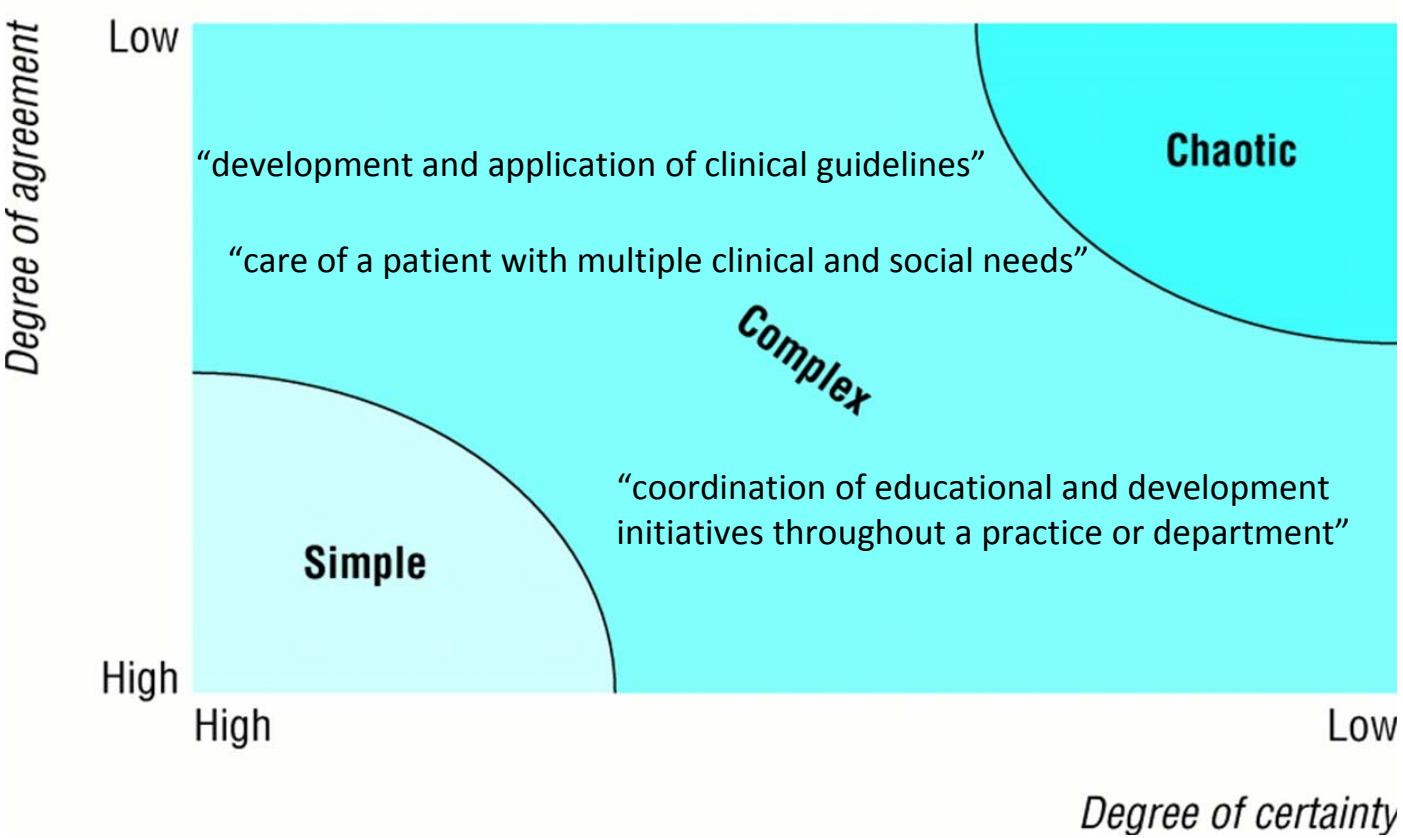
Additional slides

Run charts for complex care: comparative, actionable and educational



Pignone, AmJGast, 2009; Shojania, HealthAffairs, 2005

The ‘Zone of Complexity’ lies between the simple and the chaotic



Plsek, P., Greenhalgh, T. The Challenge of Complexity in Health Care, 2001.
http://www.bmj.com/cgi/content/full/323/7313/625