



Funded by the
John A. Hartford foundation

Initial development at
Intermountain Healthcare

Expenditure and utilization changes from a primary care-based, multicondition care management program

**David A. Dorr, K. John McConnell, Steven
Donnelly, Cherie P. Brunker**

Date: June 4, 2007

Case study

Ms. Viera

a 75-year-old woman
with diabetes,
systolic hypertension,
mild congestive heart
failure,
arthritis and
recently diagnosed
dementia.

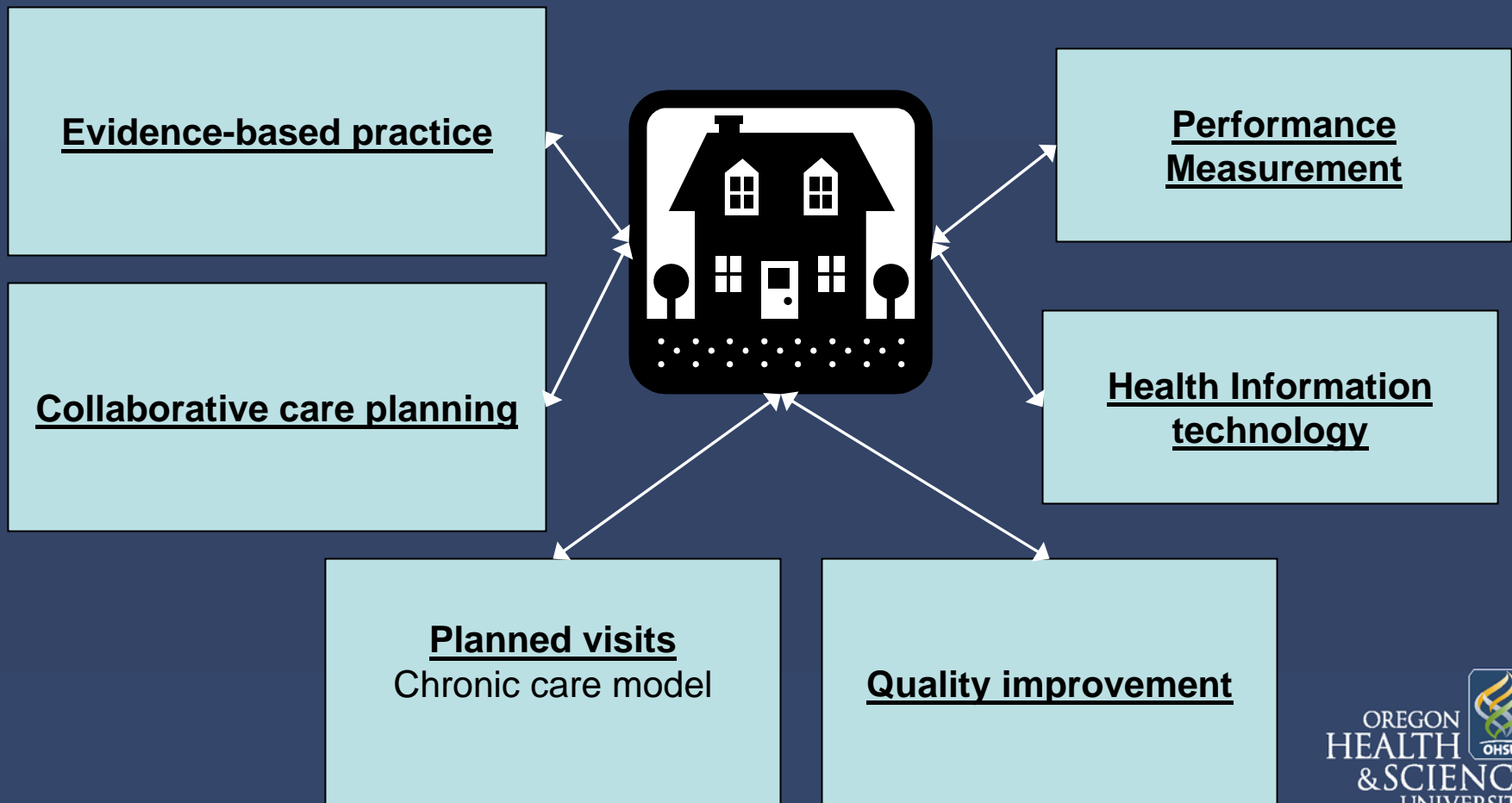
She comes to her primary care
provider (1 of 13 amb physicians) with
5 medical and 2 socioeconomic
issues.

Patients like her account for 70% of Medicare
spending. Some utilization seems to be due to lack
of care management / coordination of care.

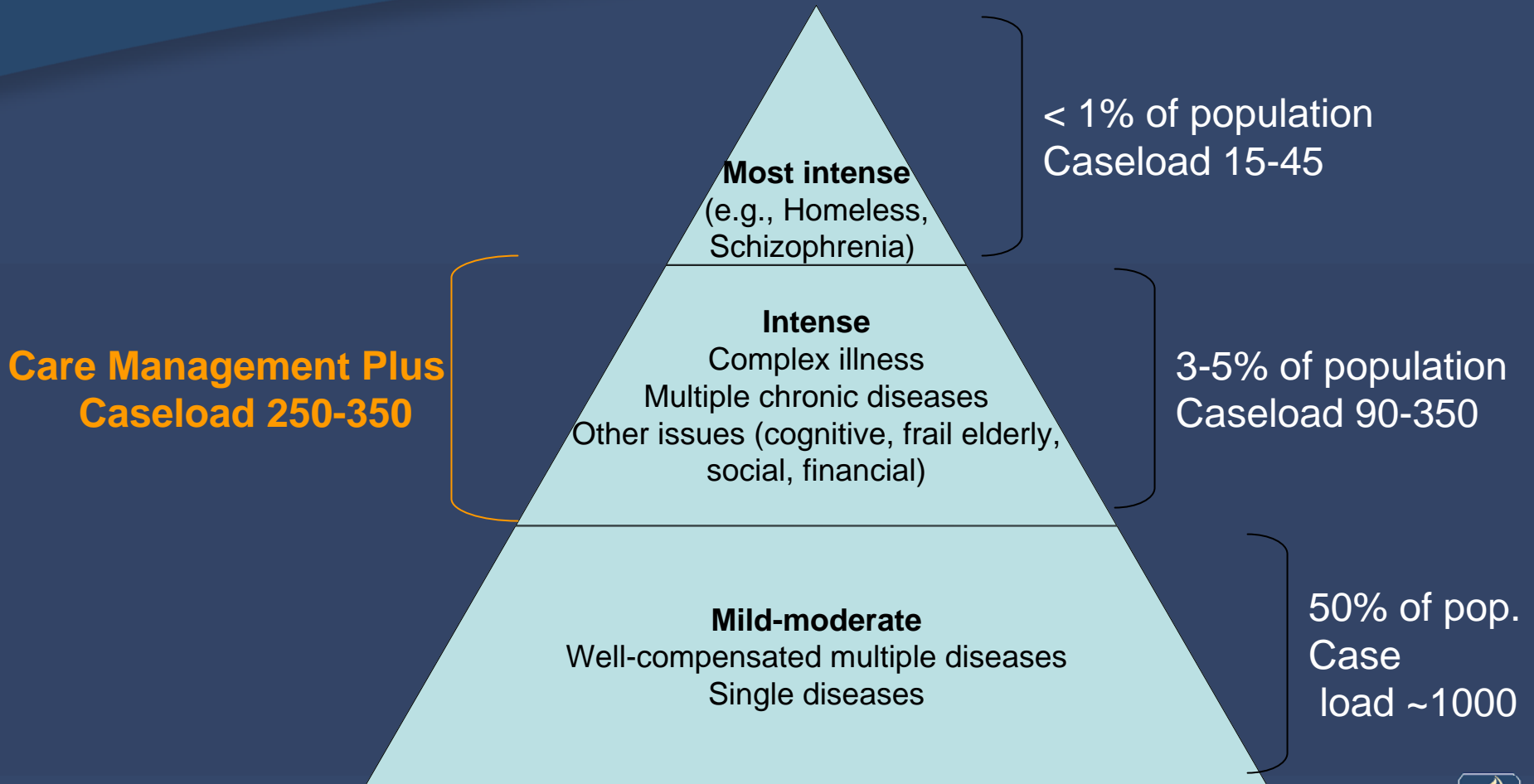


A medical home may better create a system where the needs of Ms. Viera are met.

Health care teams partner with patients & caregivers to ensure that all of their health care is effectively managed and coordinated.



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



Care Management Plus attempts to fill in core gaps in many clinics through a proactive, flexible system.

In 7 primary care clinics at Intermountain Healthcare



Technology helps the team plan and enact high quality care.

- Care management tracking database
 - Available free of charge (requires MS Access)
 - Training manuals
- Patient worksheet (summary sheet)
- Dosage expertise / specification

Patient Worksheet

Wilcox, Proc of AMIA Symp, 2005

| | | | | | |
|---|----------------------|---|-----------------------------------|-------------------------------------|---------------------------------|
| 16 November 2006 | | Patient Worksheet Selected to Print for: All Patients, All Sections, Last Clinical Note | | | u1.070 Comprehensive Version |
| PATIENT NAME TEST, BED | | SEX F | DOB 01/01/1911 | MRN# 650730 | MRN# 5992114 |
| Problems | | | | | |
| Diabetes Mellitus, Type 2 Hyperlipidemia | | Chronic conditions | | | |
| Active Medications | | | | | |
| 1. - Glucophage (Metformin HCl), 500mg, Tablet, Oral, 1 TABLET, Daily 2. - Simvastatin, 10mg, Tablet, Oral, 1 TABLET, Daily 3. - Lisinopril, 10mg, Tablet, Oral, No dose for 1 day 4. - Calcium Carbonate/Vitamin D, Calcium 500 (w/Vitamin D), 500-200, Tablet, 1 TABLET, BID | | | | | |
| Allergies | | | | | |
| (-) Penicillins - A Drug Allergen Group; Reaction(s): Rash | | | | | |
| Disease Management | | | | | |
| ADL | | Pain Score (0-10) | | WMS E | |
| 11/16/2006 | 5 | 11/16/2006 | 4 | 11/16/2006 | 24 |
| Preventive Care | | | | | |
| Pap Smear | | Mammogram | | | |
| No Data | | No Data | | | |
| Clinical Laboratory Data | | | | | |
| HgbA1c (<=7.0) | UA Protein | uAlb:Cr (<=30) | 24 Urine Albumin (<=30) | Serum Cr | |
| No Data | No Data | No Data | No Data | No Data | |
| Serum K | Lipid Profile | LDL (<=130) | Trig (<=150) | HDL (>=45) | TC/HDL Ratio |
| No Data | No Data | No Data | No Data | No Data | No Data |
| HCT | HsCRP | Homocysteine | | | |
| No Data | No Data | No Data | | | |
| Clinic Data | | | | | |
| Date | Weight | BMI (<=25) | Weight Class | Blood Pressure (<=130/80) | Heart Rate |
| 01/16/2006 | 144 lbs | 23 | Normal | 01/16/2006 122/74 mmHg | 01/16/2006 74 |
| 01/1/2005 | 155 LBS | 25 | | | |
| 05/12/2003 | 50.00 N/A | - | | | |
| Last foot exam: | 11/2005 | Abnormal | Last dilated retinal exam: | 11/2005 | Abnormal |
| Reminders | | | | | |
| Lab | | | | | |
| [] Creatinine - Patient on Metformin product(s) and no Creatinine on record. | | | | | |
| [] HgbA1C - Urine Albumin Test - HCT - Serum Cr (should be done on all Patients with Diabetes) | | | | | |
| [] HCT - Serum K (should be done on all Patients with some frequency) | | | | | |
| Procedure | | | | | |
| [] Mammogram - Suggested yearly for women age 40 and above, every 2 years age 50 and above. | | | | | |
| [] Pneumoniax - Suggested for all Patients with Diabetes and age 21 and above with no disease. | | | | | |
| [] Tetanus Immunization - Suggested for all Patients with Diabetes and age 21 and above with no disease. | | | | | |
| [] DEXA Screening - Suggested for women age 65 and over. Follow-up screening for osteoporosis recommended every 2-3 years. | | | | | |
| [] Colon Cancer screen - Suggested yearly fecal test or sigmoidoscopy Q 5 years, or colonoscopy Q 10 years. | | | | | |

Chronic conditions

Medications

Allergies

Functional status

Preventive care summary

Pertinent labs

Pertinent exams

Passive reminders

Organized by illness

Call

Care Manager Encounter Tickler List

Care Manager: Ann Larsen

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

Population Tickler

Before 3/10

IHC. Also detail

Do. wait pay est. send

pm fees 810-33-003

5 people

pcp appears

Test

who 14 people

Home - do imp. ant

Back - heal - gen name

2-3 who - health

Turn on 5' 11" 140 lbs

7-10 days 3 pm

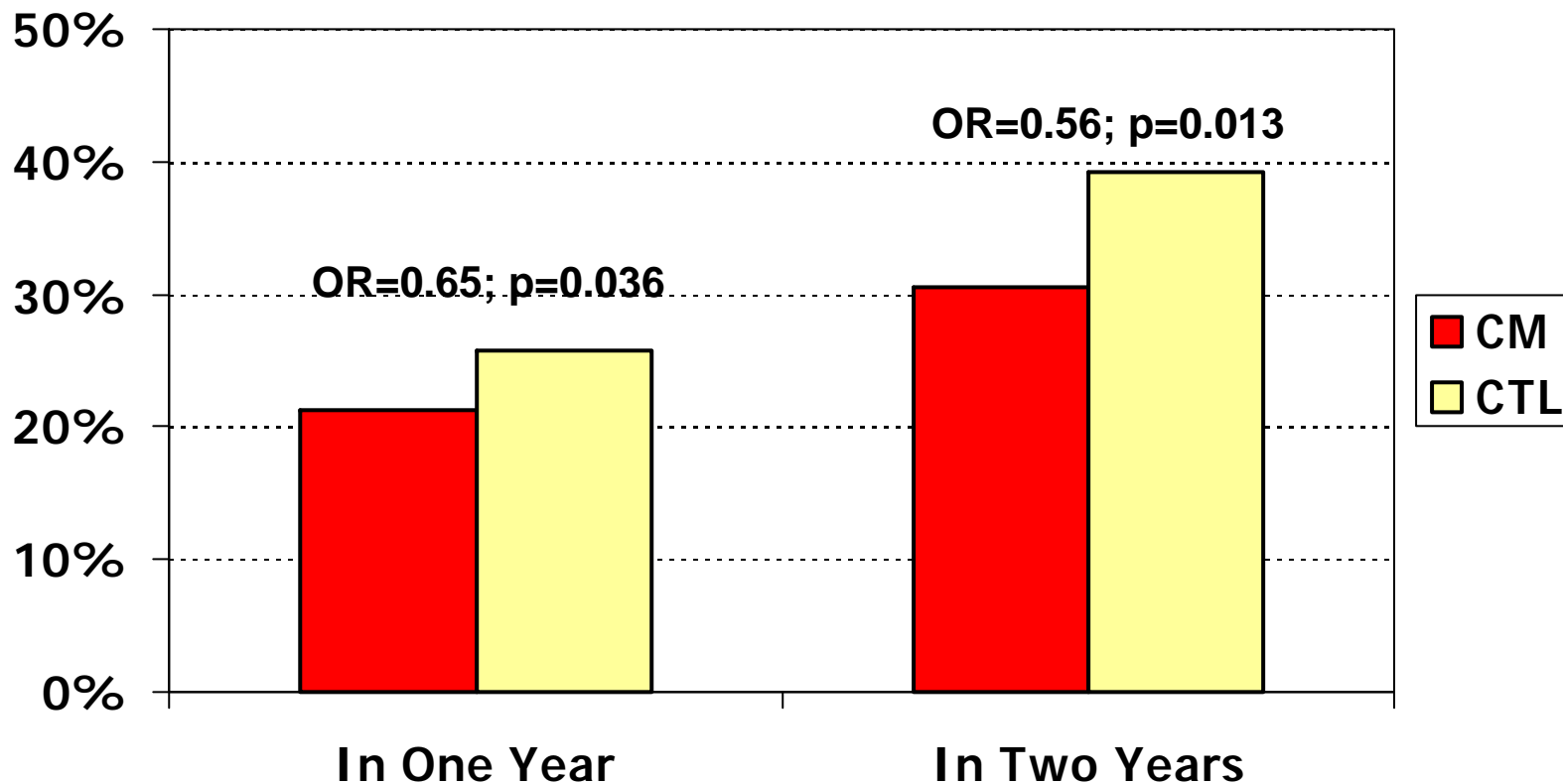
If from cat office

Dr. McBride

Initial Study: Retrospective cohort. In pts with complex illness including diabetes:

Deaths were reduced by 3% over two years (relative 27% reduction).

Admissions (any cause) were reduced by 4-8% (27-40%).



Hypothesis : Did the program affect costs?

1. Were cost profiles of persons receiving CMP altered compared to matched controls in the 2 years after intervention?
2. For which groups were costs altered?

Matching and Design

- Matching by Mahalanobis Distance Criterion on
 - Gender, age, risk score, previous hospital admission, diabetes, depression, CHF, previous expenditures
- Bias adjustment with regression (“doubly robust”)

$$E(Y_{t=0}) = X_{t=0} \beta, \text{ where } t=\text{absence of CMP}$$

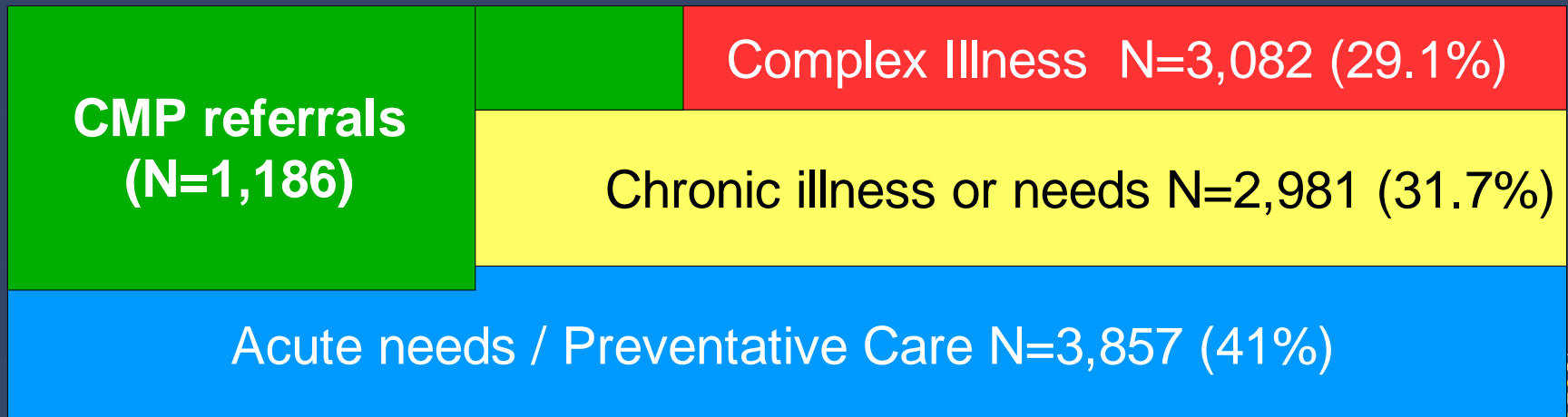
Then

$$E(Y_{i, t=1} | t = 0) = Y_{\text{matched}, t=0} + X_{i, t=1} \beta - X_{\text{matched}, t=0} \beta$$

Design : Difference of difference for baseline Medicare expenditure (1 year prior) to yearly expenditures during study (26.9 months on average) for patients > 65

Population and Referrals

- 7 intervention primary care clinics + 4 control clinics; all patients > 65 eligible
- Population structure: *Modified Charlson Comorbidity Score* > 2 = Complex illness; 1-2 Chronic Illness



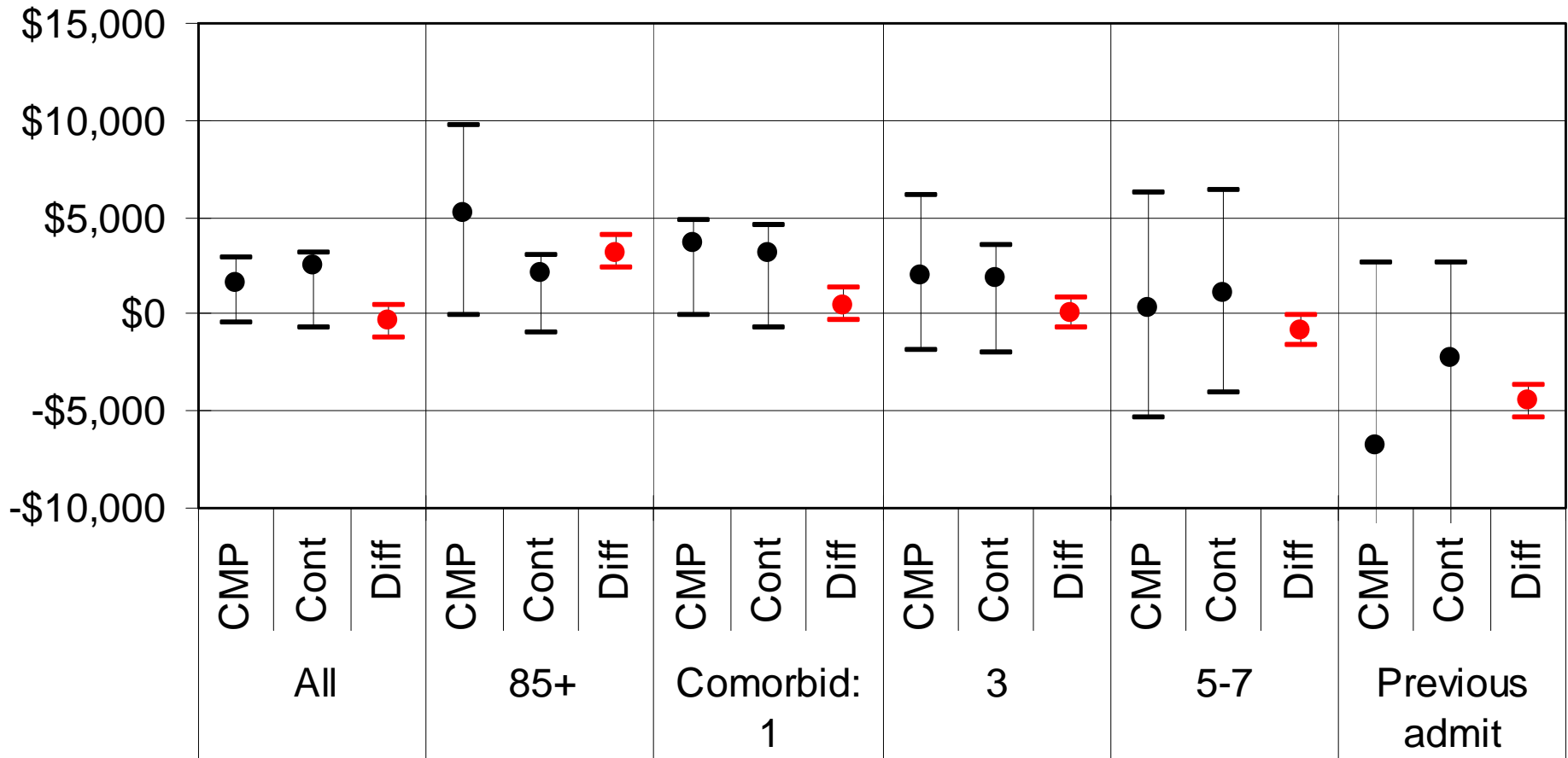
Baseline Characteristics of CMP referred vs. Unmatched Control

| | CMP | Unmatched control |
|---|------------|-------------------|
| Sex: Female | 63.8% | 53.4% |
| Age (mean/s.d.) | 76.4 (7.3) | 75.9 (7.1) |
| Age 85+ years | 15.3% | 13.2% |
| Comorbidity Score | | |
| 5 - 7 | 15.9% | 9.8% |
| 8+ | 4.4% | 2.7% |
| Utilization in previous year (one or more events) | | |
| Admission | 23.6% | 22.8% |
| PQI Admission | 5.4% | 4.4% |
| Condition | | |
| Diabetes | 48.7% | 19.5% |
| CHF | 23.4% | 11.8% |
| Depression | 26.5% | 15.4% |

Results – Costs and different of difference

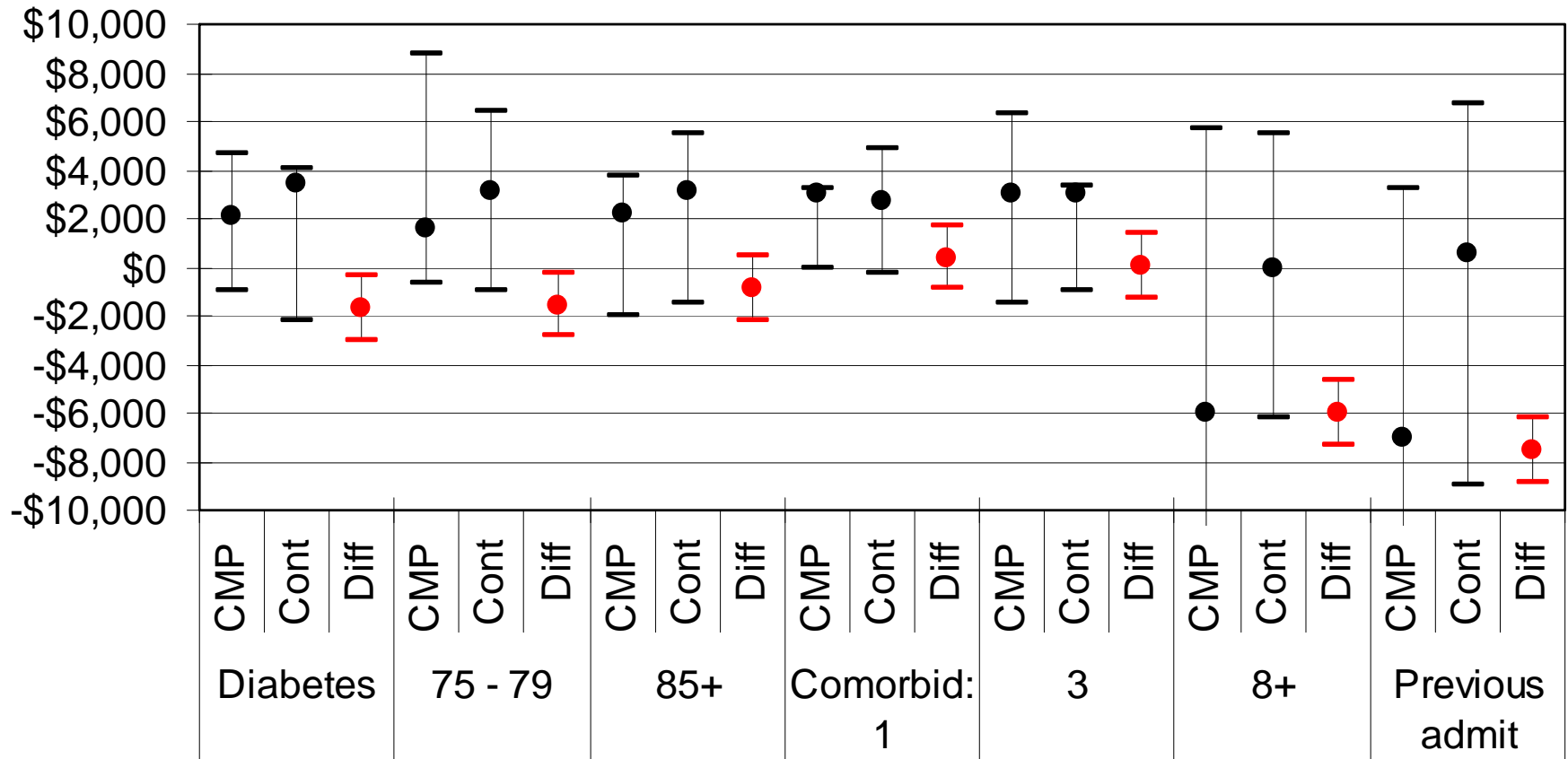
| | All potential controls (N=8,702) | Control Mahalanobis (N=950) | CMP (N=950) |
|-------------------------------|-------------------------------------|-----------------------------------|-------------|
| All Patients | Mean | Mean | Mean |
| Cost – Baseline | \$5,076 | \$5,700 | \$5,576 |
| Cost – Post | \$6,792 | \$8,487 | \$7,974 |
| Difference | \$1,716 | \$2,787 | \$2,398 |
| Diff of Difference | | -\$389 (-\$1210,+\$432.69) | |
| | | | |
| Patients with diabetes | (N=1914) | (N=480) | (N=480) |
| Cost – Baseline | \$7,790 | \$6,011 | \$5,933 |
| Cost – Post | \$8,960 | \$9,442 | \$7,714 |
| Difference | \$1,170 | \$3,431 | \$1,781 |
| Diff of Difference | | -\$1,654 (-\$2,937,-\$363) | |

Difference of costs by group: All patients



Legend: Difference of costs – Mean and 25/75% percentile
 Difference of difference – Estimate and 95% CI

Difference of costs by group: Patients with diabetes



Legend: Difference of costs – Mean and 25/75% percentile
 Difference of difference – Estimate and 95% CI

Limitations

- Several, but most importantly:
- Model is very sensitive to patient selection & model choice
 - Results not robust to all specifications
 - An area for further investigation

Conclusions for Care Management Plus intervention

- Previous analyses have shown substantial results in improving quality (disease status, satisfaction, utilization)
- What about cost?
 - Suggestive of savings, but...
- Other issues:
 - Cost profiles differ between patients, apparently more savings for
 - Patients with diabetes (especially if previously hospitalized, sicker, or older)
 - Younger patients
 - Patients with previous admissions
 - Males

Dorr, AJMC, 2007; Dorr, DisManag, 2006; Dorr, JGIM, 2007;
Wilcox, AMIA, 2005; Dorr, HSR, 2005

Future steps

- Randomized Controlled trial to limit Selection Bias
 - Using selection algorithm derived from databases (who was seen and what was done)

Breaking down the costs into component categories

- Hospitalization costs down – what went up?

The Next Phase...Dissemination

- Care Management Plus Dissemination
- New 4-year \$2.5M grant from John A. Hartford Fund
 - Focus on seniors and those with complex chronic illness
 - Pays for assessment, training, and IT consulting (how to better use tools)

Thank you!

The Care Management Plus Team

Funded by the John A. Hartford Foundation

- OHSU
 - David Dorr, MD, MS
 - K. John McConnell, PhD
 - Kelli Radican
 - Hanh Tran
 - Rachel Burdon
 - John Welte
- Intermountain Healthcare
 - Cherie Brunner, MD
- Columbia University
 - Adam Wilcox, PhD

Advisory board

- Larry Casalino
- Tom Bodenheimer
- Cheryl Schraeder
- Heather Young

www.caremanagementplus.org ; dorrd@ohsu.edu