14th Annual ACCP Community Asthma and COPD Coalitions Symposium

Preventing re-hospitalizations for COPD

October 25, 2012

Jerry A. Krishnan, M.D., Ph.D., F.C.C.P.
Professor of Medicine and Public Health
Section of Pulmonary, Critical Care, Sleep, & Allergy
Division of Epidemiology and Biostatistics
Associate Vice President, Population Health Sciences
University of Illinois Hospital & Health Sciences System

UIC
UNIVERSITY OF ILLINOIS AT CHICAGO

Conflicts of interest

- Pharmaceutical industry
  - No speaker or consultant fees
  - Invited to participate as site investigator in Phase IV clinical trial in asthma
- National Institutes of Health
  - NHLBI AsthmaNet
  - NHLBI COPD Clinical Research Network
  - NHLBI COPD Outcomes based Network for Clinical Effectiveness and Research Translation

Outline

- The numbers
- Tale of 3 studies
- Lessons learned
- (some) Unanswered questions and next steps

The numbers (2008)

- 822,500 hospitalizations for COPD (ICD9 codes)
  - LOS 4.7 days / hosp
  - Cost $7,500 / hosp , $6.1 billion total costs
  - Insurance
    - 69% Medicare, 10% Medicaid
    - 16% Private
    - 3% Uninsured
  - Discharge location
    - Home 67%, Other facility 13%, Deaths 1.6%, Other

Wier, L.M. , AHRQ HCUP, Statistical Brief #106, 2011

Table 2. Most common secondary diagnoses associated with a principal diagnosis of COPD, 2008

	All COPD		Acute exacerbation		Without acute exacerbation	
Secondary diagnoses	Number (%)	Rank	Number (%)	Rank	Number (%)	Rank
Essential hypertension	415,800 (50.6%)	1	257,500 (50.1%)	1	158,300 (51.3%)	1
Current and/or past use/abuse of tobacco	379,700 (46.2%)	2	244,400 (47.5%)	2	135,300 (43.9%)	2
Coronary atherosclerosis and other heart disease	245,600 (29.9%)	3	159,100 (31.0%)	3	86,500 (28.0%)	4
Disorders of lipid metabolism	228,400 (27.8%)	4	141,100 (27.5%)	4	87,300 (28.3%)	3
Diabetes mellitus without complication	207,600 (25.2%)	5	126,800 (24.7%)	6	80,800 (26.2%)	5
Congestive heart failure	196,900 (23.9%)	6	130,000 (25.3%)	5	66,900 (21.7%)	6
Fluid and electrolyte disorders	178,700 (21.7%)	7	113,500 (22.1%)	7	65,300 (21.2%)	8
Cardiac dysrhythmias	170,600 (20.7%)	8	111,100 (21.6%)	8	59,500 (19.3%)	9
Esophageal disorders	166,500 (20.2%)	9	100,000 (19.5%)	11	66,500 (21.6%)	7
Respiratory failure	153,300 (18.6%)	10	105,800 (20.6%)	10	47,500 (15.4%)	11
Pneumonia	147,000 (17.9%)	11	106,000 (20.6%)	9	41,000 (13.3%)	13
Mood disorders (depressive and bipolar disorders)	141,500 (17.2%)	12	87,100 (16.9%)	12	54,400 (17.6%)	10

Note: More than one secondary diagnosis may be recorded during a hospital stay.

Note: The distribution of other COPD discharges is statistically different from the distribution of acute exacerbation discharges at $p<0.05$.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample

Table 3. Most common principal diagnoses for patients with COPD as a secondary diagnosis, 2008

	All COPD*		Acute exacerbation*		Without acute exacerbation*	
Total stays with COPD as secondary diagnosis	3,827,100		619,200		3,207,900	
Principal Diagnosis	**Number (%)**	**Rank**	**Number (%)**	**Rank**	**Number (%)**	**Rank**
Pneumonia	370,800 (9.7%)	1	138,000 (22.3%)	1	232,800 (7.3%)	1
Congestive heart failure	310,200 (8.1%)	2	80,300 (13.0%)	3	229,900 (7.2%)	2
Respiratory failure	245,100 (6.4%)	3	132,600 (21.4%)	2	112,500 (3.5%)	4
Septicemia	145,300 (3.8%)	4	39,200 (6.3%)	4	106,100 (3.3%)	5
Coronary atherosclerosis	128,100 (3.3%)	5	7,300 (1.2%)	10	120,800 (3.8%)	3
Cardiac dysrhythmias	115,100 (3.0%)	6	11,600 (1.9%)	7	103,500 (3.2%)	6
Acute myocardial infarction	107,000 (2.8%)	7	18,600 (3.0%)	5	88,400 (2.8%)	7
Nonspecific chest pain	85,400 (2.2%)	8	4,300 (0.7%)	15	81,100 (2.5%)	8
Cancer of bronchus; lung	72,700 (1.9%)	9	11,400 (1.8%)	8	61,300 (1.9%)‡	10
Complication of device; implant or graft	70,500 (1.8%)	10	3,400 (0.5%)	23	67,100 (2.1%)	9
Aspiration pneumonia; food/emesis	68,600 (1.8%)	18	16,900 (2.7%)	6	39,700 (1.2%)	23
Acute renal failure	61,900 (1.6%)	11	10,100 (1.6%)	9	58,500 (1.8%)	12

More numbers: COPD #3 cause of readmissions in Medicare beneficiaries

TABLE 5–3

Hospital readmissions for seven conditions make up almost 30 percent of spending on readmissions

Condition	Type of hospital admission	Number of admissions with readmissions	Readmission rate	Average Medicare payment for readmission	Total spending on readmissions
Heart failure	Medical	90,273	12.5%	$6,531	$590,000,000
COPD	Medical	52,327	10.7	6,587	345,000,000
Pneumonia	Medical	74,419	9.5	7,165	533,000,000
AMI	Medical	20,866	13.4	6,535	136,000,000
CABG	Surgical	18,554	13.5	8,136	151,000,000
PTCA	Surgical	44,293	10.0	8,109	359,000,000
Other vascular	Surgical	18,029	11.7	10,091	182,000,000
Total for seven conditions		318,760			$2,296,000,000
Total DRGs		1,134,483			$7,980,000,000
Percent of total		28.1%			28.8%

Note: COPD (chronic obstructive pulmonary disease), AMI (acute myocardial infarction), CABG (coronary artery bypass graft), PTCA (percutaneous transluminal coronary angioplasty), DRG (diagnosis related group). Analysis is for readmissions within 15 days of discharge from the initial inpatient stay. Readmissions are identified using 3M's software that defines potentially preventable readmissions.

Source: 3M analysis of 2005 Medicare discharge claims data.

MedPAC (Medicare Payment Advisory Commission), Report to Congress, 2007

Summary

1. 800,000 hospitalizations, $7,500 per hospitalization
2. Patients hospitalized for COPD also have HTN, DM, CAD, smoking history, HF
3. Patients with PNA, HF, sepsis, AMI often also have COPD
4. Among the most costly cause of readmissions for Medicare

Outline

- The numbers
- Tale of 3 studies
- Lessons learned
- (some) Unanswered questions and next steps

BMJ

Study #1

BMJ 2012;344:e1060 doi: 10.1136/bmj.e1060 (Published 6 March 2012)

RESEARCH

Glasgow supported self-management trial (GSuST) for patients with moderate to severe COPD: randomised controlled trial


OPEN ACCESS

C E Bucknall *consultant respiratory physician*[1], G Miller *research fellow*[1], S M Lloyd *biostatistician*[2], J Cleland *professor of medical education*[3], S McCluskey *senior research nurse*[1], M Cotton *consultant respiratory physician*[1], R D Stevenson *consultant respiratory physician*[1], P Cotton *professor of learning and teaching*[4], A McConnachie *deputy director*[2]

[1]Department of Respiratory Medicine, Glasgow Royal Infirmary, Glasgow G4 0SF, UK; [2]Robertson Centre for Biostatistics, University of Glasgow, Glasgow; [3]Division of Medical and Dental Education, School of Medicine, University of Aberdeen, Aberdeen, UK; [4]Undergraduate Medical School, University of Glasgow

Setting and patients

- 6 Acute Glasgow hospitals and Lanarkshire hospitals
- Patients recently discharged from hospital following AE-COPD
  - FEV<70%, FEV1/FVC<70%
  - Excluded : hx of asthma, or left HF, active cancer, confusion/poor memory

Bucknall CE, BMJ 2012

Intervention

- Both groups
  - "Long term treatment optimized"
  - Inhaler technique teaching
  - Offered smoking cessation advice and pulmonary rehabilitation
- Control group
  - Managed by their physician

- Intervention group – "supported self-management"
  - 4 home visits over 2 mos, then q6 weeks, plus PRN
  - Diary cards to record Sx, then initiate tx with Abx X 7 days and prednisone X 5 days based on algorithm

Bucknall CE, BMJ 2012

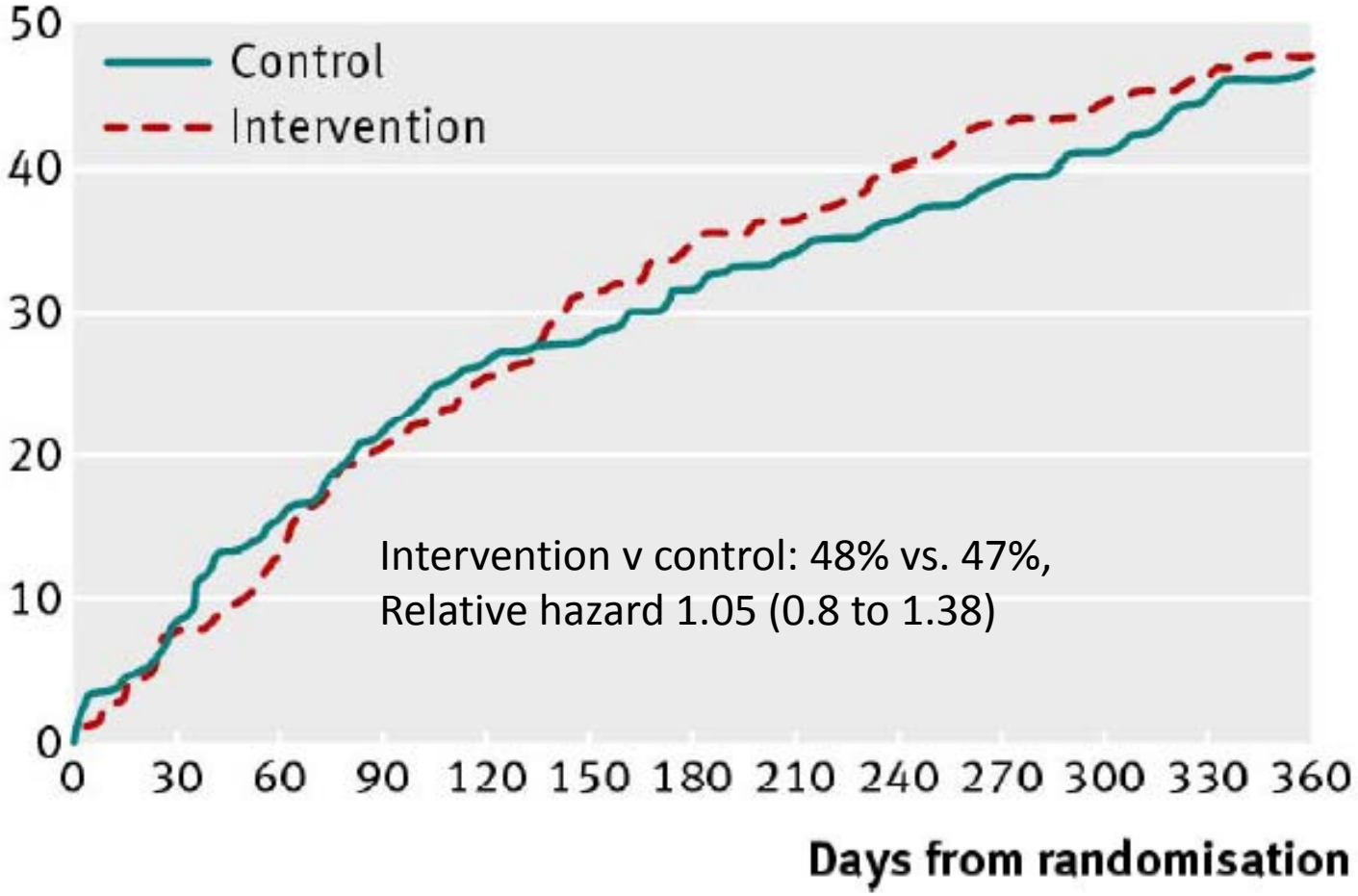
Results

- N=464, 232/ group
- Baseline - balanced
  - Mean 69 YO
  - 37% men
  - FEV1 40% pred
  - 41% lived alone
  - 39% current smoker
  - 59% hosp for COPD past 12 mos
  - 7% LTOT

- Enrolled /intervention began median 29 days after DC
- Only 42% in intervention group learned to self-manage using diary cards
  - Predictors
    - Younger patients
    - Living with others

Bucknall CE, BMJ 2012

Hospitalized or death from COPD, %



Bucknall CE, BMJ 2012

Lesson #1: Interventions to prevent re-hospitalizations may have **no effect**

- Intervention too late
  - 29 days after DC
- Intervention too weak
  - 42% able to self-manage
- Intervention incomplete
  - No home exercise program
- Measurement error
  - COPD-specific vs. all-cause
  - Power - Relative hazard 1.05 (0.8 to 1.38)

Study #2

Eur Respir J 2006; 28: 123–130
DOI: 10.1183/09031936.06.00063205

Integrated care prevents hospitalisations for exacerbations in COPD patients

A. Casas*, T. Troosters+, J. Garcia-Aymerich#, J. Roca*, C. Hernández*, A. Alonso*, F. del Pozo¶, P. de Toledo¶, J.M. Antó#, R. Rodríguez-Roisín*, M. Decramer+ and members of the CHRONIC Project

ABSTRACT: **Hospital admissions due to chronic obstructive pulmonary disease (COPD) exacerbations have a major impact on the disease evolution and costs. The current authors postulated that a simple and well-standardised, low-intensity integrated care intervention can be effective to prevent such hospitalisations.**

Therefore, 155 exacerbated COPD patients (17% females) were recruited after hospital discharge from centres in Barcelona (Spain) and Leuven (Belgium). They were randomly assigned to either integrated care (IC; n=65; age mean±SD 70±9 yrs; forced expiratory volume in one second (FEV_1) 1.1±0.5 L, 43% predicted) or usual care (UC; n=90; age 72±9 yrs; FEV_1

AFFILIATIONS
*Servei de Pneumologia and Technology Innovation Unit, Hospital Clínic, IDIBAPS, Universitat de Barcelona,
#Respiratory and Environmental Health Research Unit, Institut Municipal d'Investigació Mèdica (IMIM-IMAS), Universitat Pompeu Fabra, Barcelona, and
¶Grupo de Bioingeniería y

Setting and patients

- Two tertiary hospitals in Barcelona/Spain and Leuven/Belgium
- Patients
  - Hospitalized for AE-COPD
  - Excluded
    - Not living in area
    - Severe comorbid illness
    - Logistical limitations (e.g., no phone)
    - Admitted to nursing home

Intervention

- Usual care
  - Managed by their physician

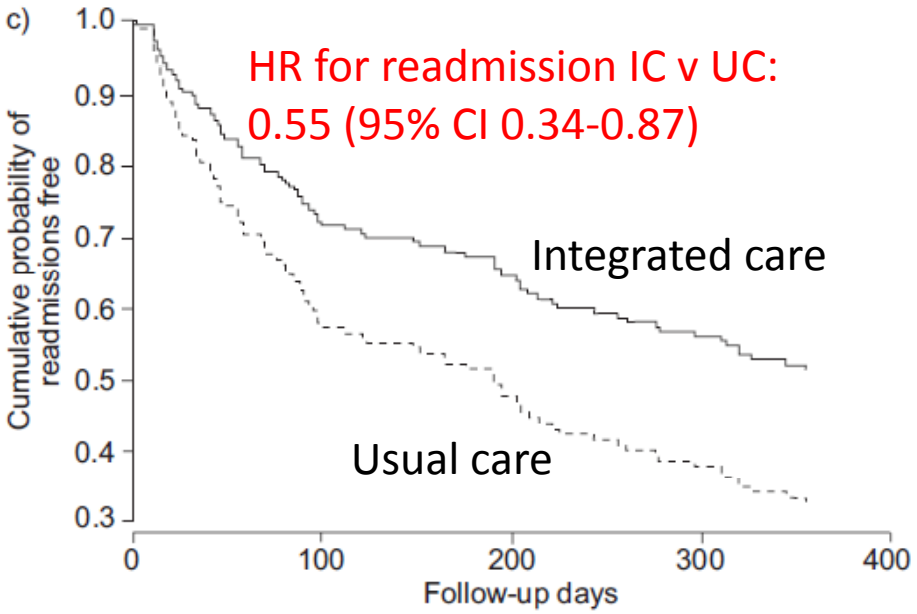
- Integrated Care
  - 2 hr education by RN before DC
    - COPD, use of meds/non meds, tx for exacerbations
    - Customized treatment plan
  - Barcelona – Home visit primary care team (MD, nurse, social worker) within 72 h of DC
  - Leuven – Home visits by GPs. Study physician contacted GPs to provide additional recommendations.
  - Phone calls q1 week X 4, then at 3 and 9 months to reinforce self-management
  - RN case manager at call center, web access to medical records

Casas A, ERJ 2006

Results

- N=155, 65 intervention, 90 usual care
- Baseline
  - Mean 70 YO
  - 83% men
  - FEV1 42% pred
  - 26% current smoker
  - 17% LTOT

- Intervention began before DC



No differences in deaths, IC v UC: 19 v 16%

Casas A, ERJ 2006

Lesson #2: Interventions **can prevent** re-hospitalizations

- Why did the intervention succeed?
  - Timing of intervention (prior to DC)?
  - Enhanced self-management (but not reported)?
  - Expertise of providers at home visits?
- Measurement error?
  - Lack of masking
  - Type I error?

BREATH Trial Study #3

A Comprehensive Care Management Program to Prevent Chronic Obstructive Pulmonary Disease Hospitalizations

A Randomized, Controlled Trial

Vincent S. Fan, MD, MPH; J. Michael Gaziano, MD, MPH; Robert Lew, PhD; Jean Bourbeau, MD, MSc; Sandra G. Adams, MD, MS; Sarah Leatherman, MS; Soe Soe Thwin, PhD, MS; Grant D. Huang, PhD, MPH; Richard Robbins, MD; Peruvemba S. Sriram, MD; Amir Sharafkhaneh, MD; M. Jeffery Mador, MD; George Sarosi, MD; Ralph J. Panos, MD; Padmashri Rastogi, MD; Todd H. Wagner, PhD; Steven A. Mazzuca, PhD; Colleen Shannon, MPH; Cindy Colling, RPH, MS; Matthew H. Liang, MD, MPH; James K. Stoller, MD, MS; Louis Fiore, MD, MPH; and Dennis E. Niewoehner, MD

Courtesy of D. Niewoehner, MD

Ann Intern Med 2012;156:673-683

BREATH Trial: Study Design

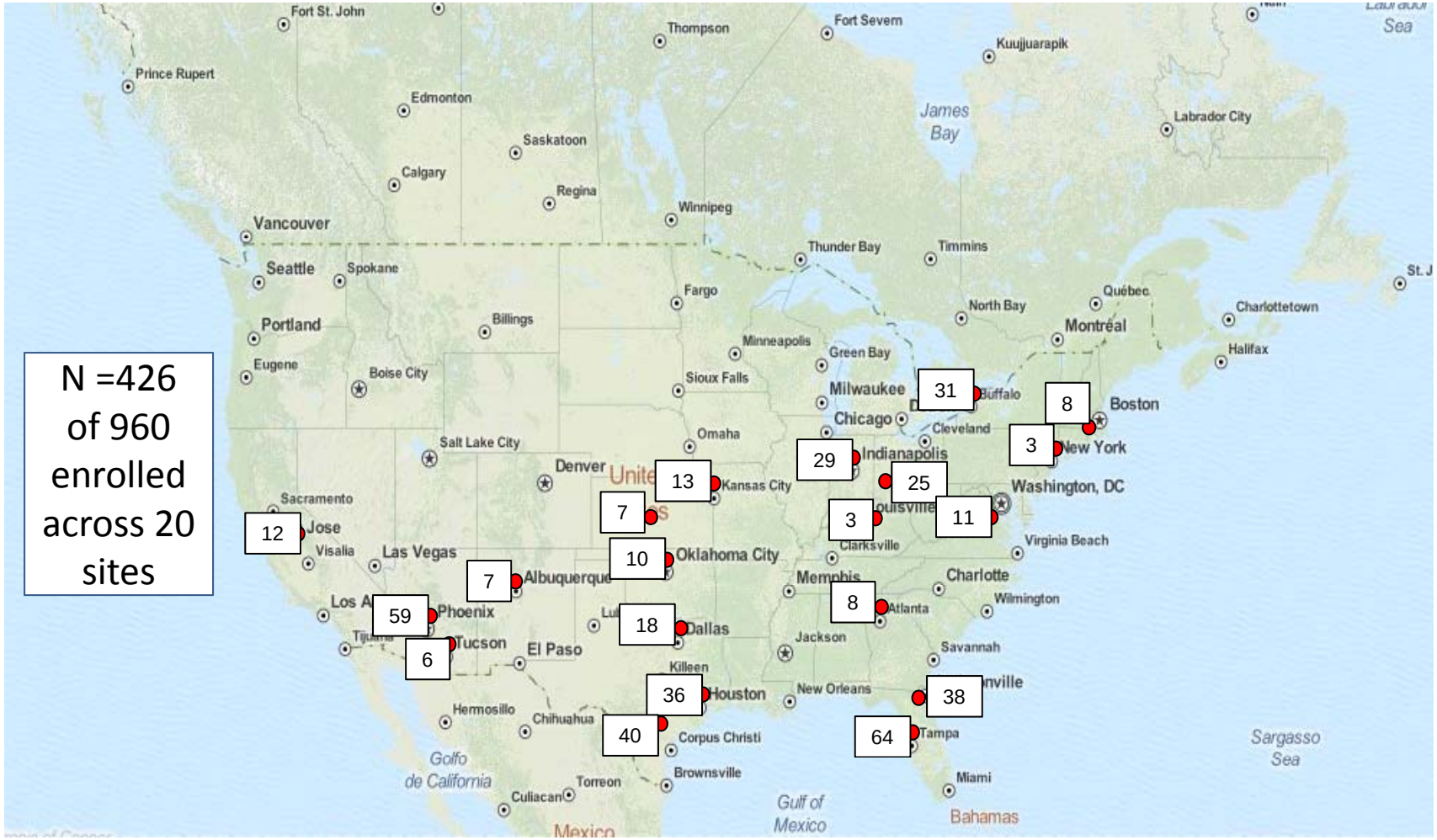
- RCT, VA Cooperative Studies Program, of case-manager facilitated self-management vs. usual care
  - Target **960 patients at 20 sites**
  - Study stopped <50% enrollment due to excess adverse events in 1 group
- Major eligibility criterion = COPD-related hospitalization in prior year
- Intervention
  - "Living Well with COPD" (4 individual and 1 group sessions, each 1-1.5 hours)
  - Written action plan with refillable antibiotic and prednisone prescriptions
  - Case manager made calls q1 month X 3 mos, then q3 months; plus PRN by patient
- Primary outcome – 1st COPD hospitalization over 1-3 years

Courtesy of D. Niewoehner, MD

Ann Intern Med 2012;156:673-

BREATH Trial: Study sites

N =426 of 960 enrolled across 20 sites

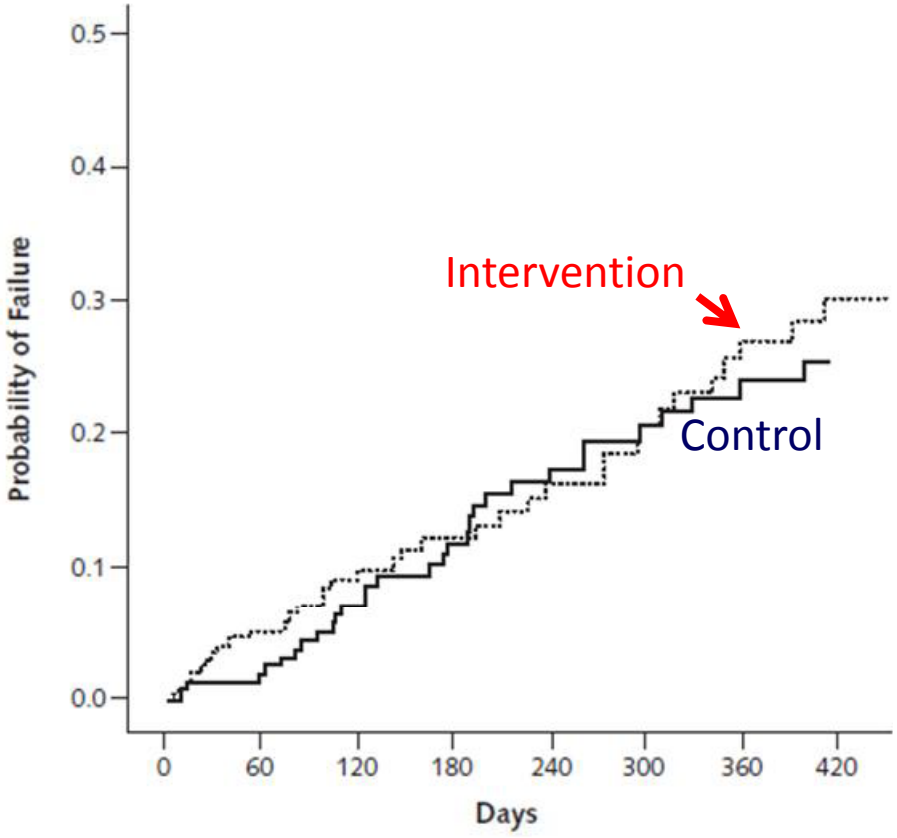


Courtesy of D. Niewoehner, MD

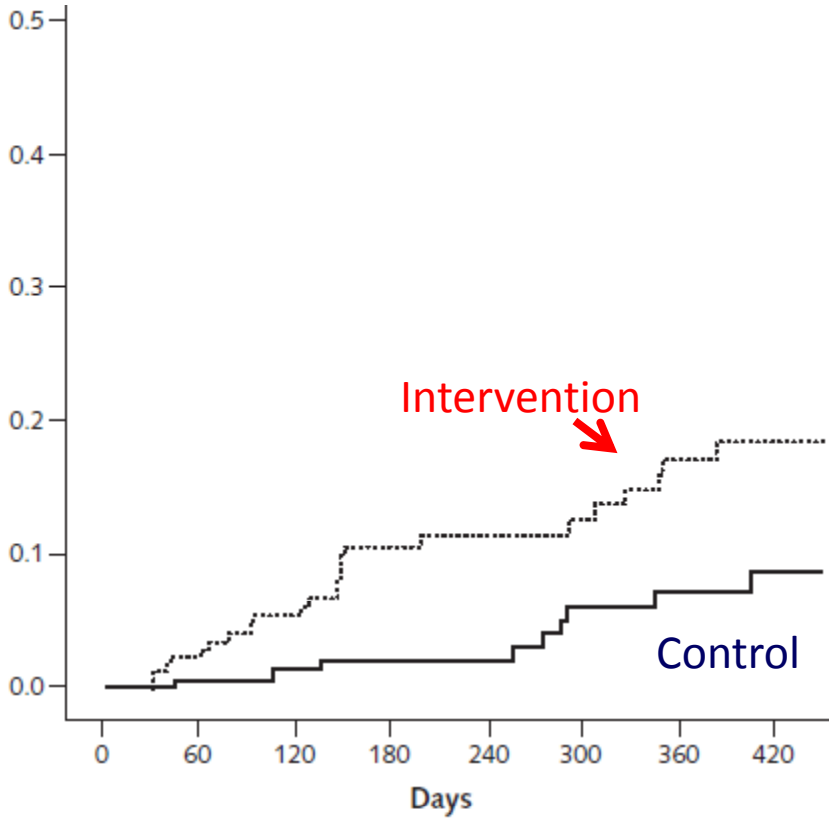
Ann Intern Med 2012;156:673-683

BREATH Trial: Results

Hospitalization for COPD
HR = 1.13 [95% CI, 0.70 to 1.80], *P 0.62*



All cause mortality
HR = 3.00 [95% CI, 1.46 to 6.17], *P=0.003*



Courtesy of D. Niewoehner, MD

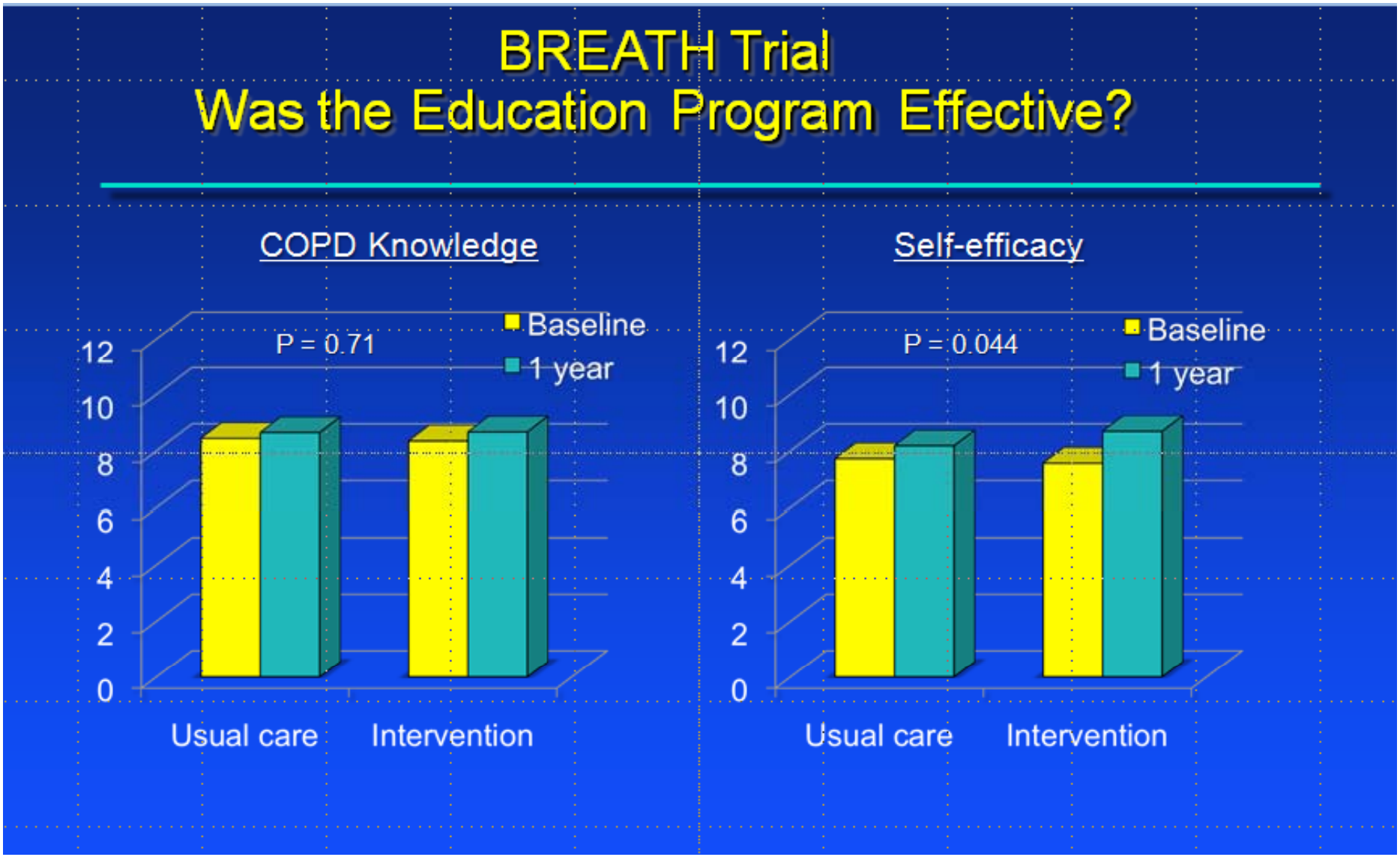
Ann Intern Med 2012;156:673-683

BREATH Trial: Results

Cause of death	Usual care deaths	Intervention deaths	Hazard ratio (95% CI)	P value
All cause	10	28	3.00 (1.46-6.17)	0.003
COPD	3	10	3.60 (0.99-13.08)	0.053
Cardiovascular	2	3	1.62 (0.27-9.72)	0.60
Other	2	7	3.78 (0.78-18.17)	0.096
Unknown	3	8	2.81 (0.74-10.56)	0.128

Courtesy of D. Niewoehner, MD

Ann Intern Med 2012;156:673-683



Courtesy of D. Niewoehner, MD

Ann Intern Med 2012;156:673-683

Lesson #3: Interventions to prevent re-hospitalizations **may be harmful**

Possible causes:

1. Chance
2. Imbalance in baseline characteristics (identified and unidentified)
   - Fewer married (44% v 52%), more with HF (20 vs. 15%) in intervention group
3. Intervention itself (e.g., delay in seeking medical care)

Courtesy of D. Niewoehner, MD

Ann Intern Med 2012;156:673-683

Outline

- The numbers
- Tale of 3 studies
- Lessons learned
- (some) Unanswered questions and next steps

Lessons learned

1. Some educational interventions may not work
2. Some educational interventions may work
   - Why?
3. Some educational interventions may be harmful
   - Just do it may be incorrect
   - “Quality improvement” that are not evidence based may be injurious

Outline

- The numbers
- Tale of 3 studies
- Lessons learned
- (some) Unanswered questions and next steps

(some) Unanswered questions and next steps

- Who
  - Navigator
- What
  - Comorbidity
- When
  - Start, frequency, duration
- Where
- Cost and cost-effectiveness

- In the meantime
  - Keep it simple
  - Evidence based treatment recommendations in hospital and post DC
  - Provide clear instructions to patient / caregiver before DC
    - Reconcile and teach use of medicines
    - Arrange follow-up
  - Communicate DC instructions with outpatient provider

Donald Rumsfeld

On preventing re-hospitalizations for COPD

"… there are things we know we know…. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns– the ones we don't know we don't know."