

# Primary Care/Specialty care in an Era of Multimorbidity

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ACGs: One System, Many Nations  
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# Interest in case mix is increasing globally

- Population health care needs are rising, resource availability is not; focusing on “higher risk” patients makes sense.
- Data systems and data collection are improving.
- Management systems are integrating primary, secondary, and community care.
- There is an increased interest in the equitable delivery of health care.

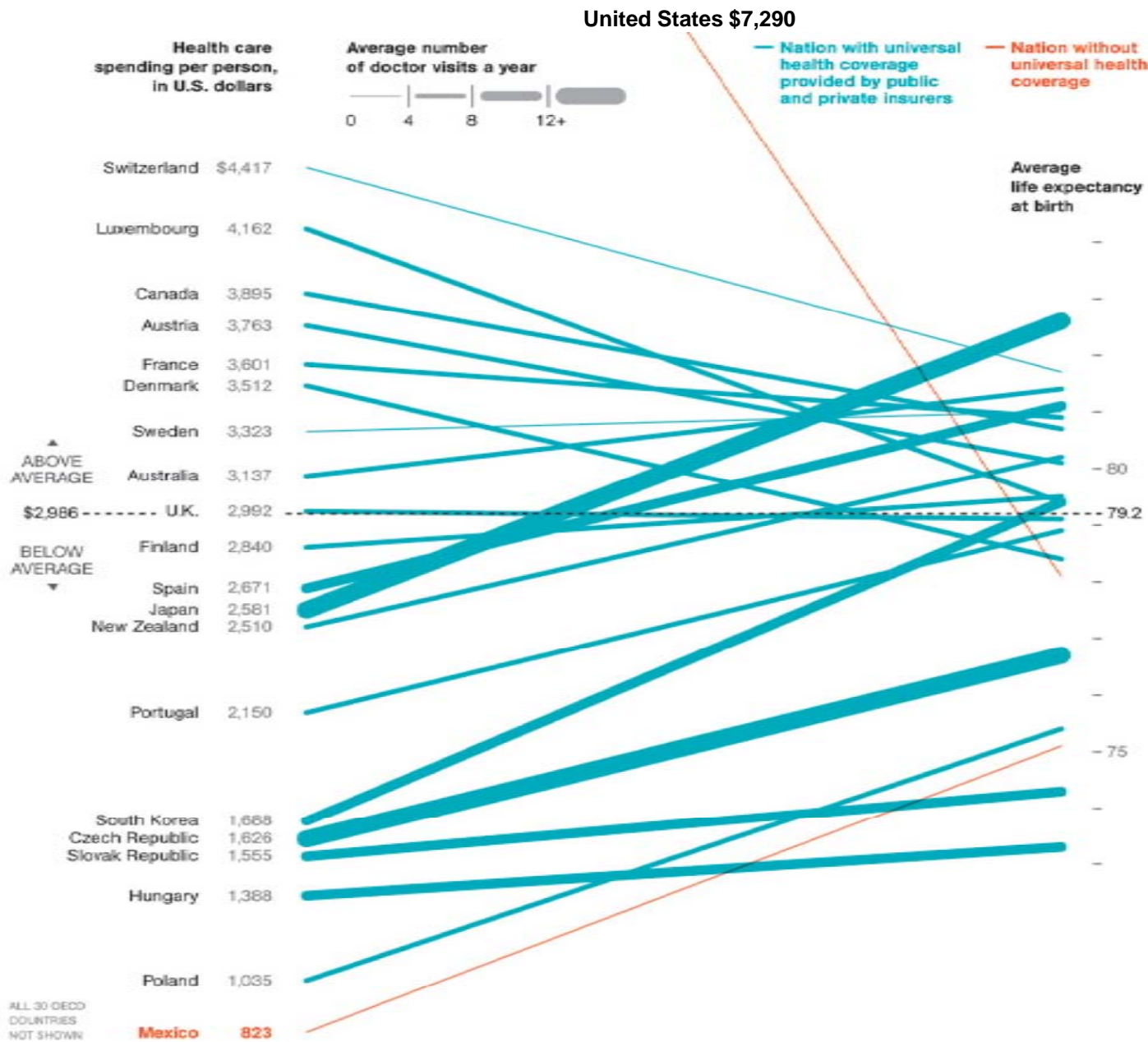
# ACG System's International Presence

- Several Provinces in **Canada**
- Numerous County Councils in **Sweden**
- Several Regions of **Spain**
- Multiple Primary Care Trusts in the **UK**
- Sickness Fund in **Germany**
- The largest Health Plan in **Israel**
- Two Medical Schemes in **South Africa**
- The veterans medical system in **Taiwan**
- The Ministry of Health in **Malaysia**
- Active piloting in **Peru** and **Chile**
- Research in **Lithuania, Korea, Thailand**
- Interest expressed in numerous other countries

# Success Stories



# The Cost of Care

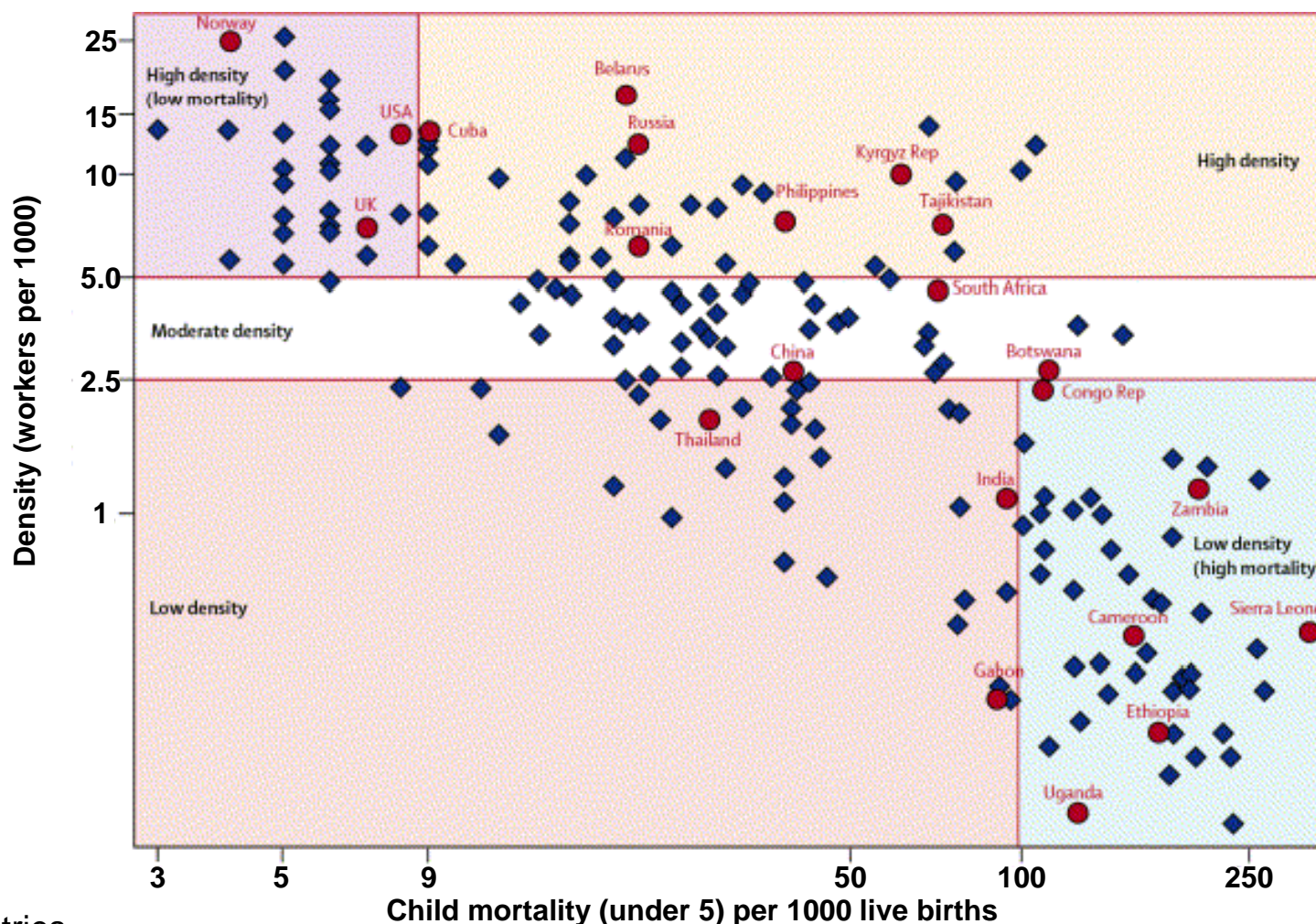


Dollar figures reflect all public and private spending on care, from doctor visits to hospital infrastructure. Data are from 2007 or the most recent year available.

Source: <http://blogs.ngm.com/.a/6a00e0098226918833012876674340970c-800wi> (accessed January 4, 2010). Graphic by Oliver Liberti, National Geographic staff. Data from OECD Health Data 2009.

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IC 7251 n

# Country\* Clusters: Health Professional Supply and Child Survival



\*186 countries

Source: Chen et al, Lancet 2004; 364:1984-90.

Starfield 07/07  
HS 6333 n

# Primary Care and Specialist Physicians per 1000 Population, Selected OECD Countries, 2007

Country	Primary Care	Specialists
Belgium	2.2	2.2
France	1.6	1.7
Germany	1.5	2.0
US	1.0	1.5
Australia	1.4	1.4
Canada	1.0	1.1
Sweden	0.6	2.6
Denmark	0.8	1.2
Finland	0.7	1.6
Netherlands	0.5	1.0
Spain	0.9	1.2
UK	0.7	1.8
Norway	0.8	2.2
Switzerland	0.5	2.8
New Zealand	0.8	0.8
OECD average	0.9	1.8

A study of individuals seen in a year in large health care plans in the US found:

	elderly	non-elderly
percent who saw a specialist	95	69
average number of different specialists seen	4.0	1.7
average number of visits to specialists	8.8	3.3
<u>total</u> visits to both primary care and specialists	11.5	5.9

A study of individuals (ages 20-79) seen over two years in Ontario, Canada, found:

percent who saw a specialist	53.2
median number of visits to specialists	1.0
<u>total</u> visits to both primary care and specialists	7.0

The US has a significantly higher proportion of people (compared with Canada, France, Netherlands, New Zealand, United Kingdom) who see two or more specialists in a year – 27%, and 38% among people with chronic illness. Even these figures, obtained from population surveys, understate the heavy use of multiple physicians seen in a year in the US.

# Percent of Patients Reporting Any Error by Number of Doctors Seen in Past Two Years

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Country	One doctor	4 or more doctors
Australia	12	37
Canada	15	40
Germany	14	31
New Zealand	14	35
UK	12	28
US	22	49

In the United States, half of all outpatient visits to specialist physicians are for the purpose of routine follow-up.

Does this seem like a prudent use of expensive resources, when primary care physicians could and should be responsible for ongoing patient-focused care over time?

In New Zealand, Australia, and the US, an average of 1.4 problems (excluding visits for prevention) were managed in each visit. However, primary care physicians in the US managed a narrower range: 46 problems accounted for 75% of problems managed in primary care, as compared with 52 in Australia and 57 in New Zealand.

Comprehensiveness in primary care is necessary in order to avoid unnecessary referrals to specialists, especially in people with comorbidity.

# Comprehensiveness in Primary Care\*

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Wart removal	IUD insertion IUD removal Pap smear
Suturing lacerations	Hearing screening
Removal of cysts	Vision screening
Joint aspiration/injection Foreign body removal (ear, nose) Sprained ankle splint	Age-appropriate surveillance Family planning Immunizations Smoking counseling
Remove ingrowing toenail	Home visits as needed
Behavior/MH counseling	Nutrition counseling
Electrocardiography	OTHERS?
Examination for dental status	

\*Unanimous agreement in a survey of family physician experts in ten countries (2008)

# Comprehensiveness: Canadian Family Physicians

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## Advanced procedural skills

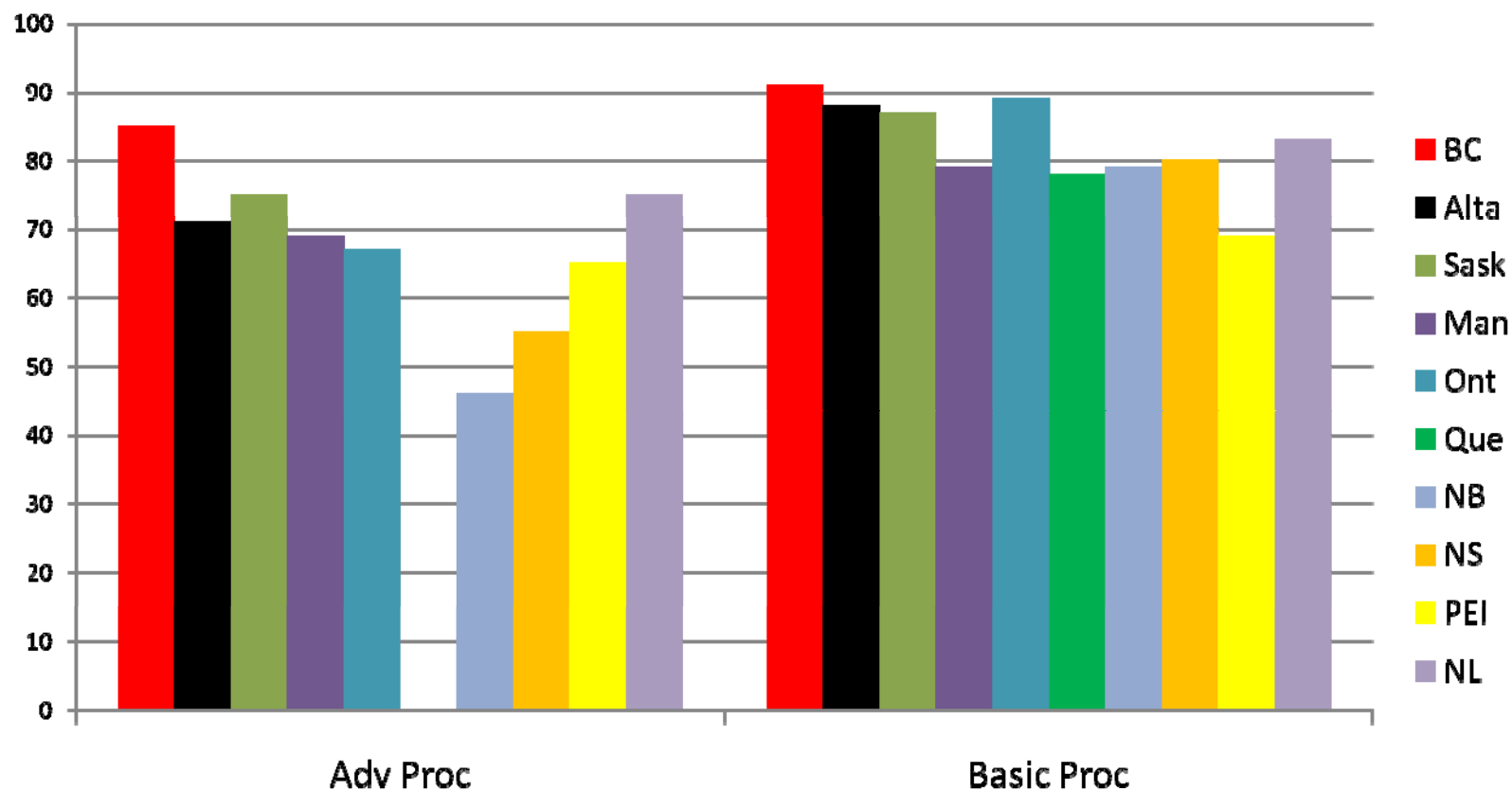
- Sigmoidoscopy
- Intensive care/resuscitation
- Nerve blocks
- Minor fractures
- Chalazion
- Tumour excision
- Vasectomy
- Varicose veins
- Rhinoplasty
- Fractures

## Basic procedural skills

- Insertion of IUD
- Biopsy
- Cryotherapy
- Electrocardiogram
- Injection/aspiration of joint
- Allergy/hyposensitization test
- Excision of nail
- Wound suture
- Removal of foreign body
- Incision, abscess, etc.

NOTE that British Columbia family physicians are more comprehensive than their counterparts in other provinces.

# Provincial Participation Rates of Canadian Fee-for-Service Family Physicians in: Advanced and Basic Procedural Skills

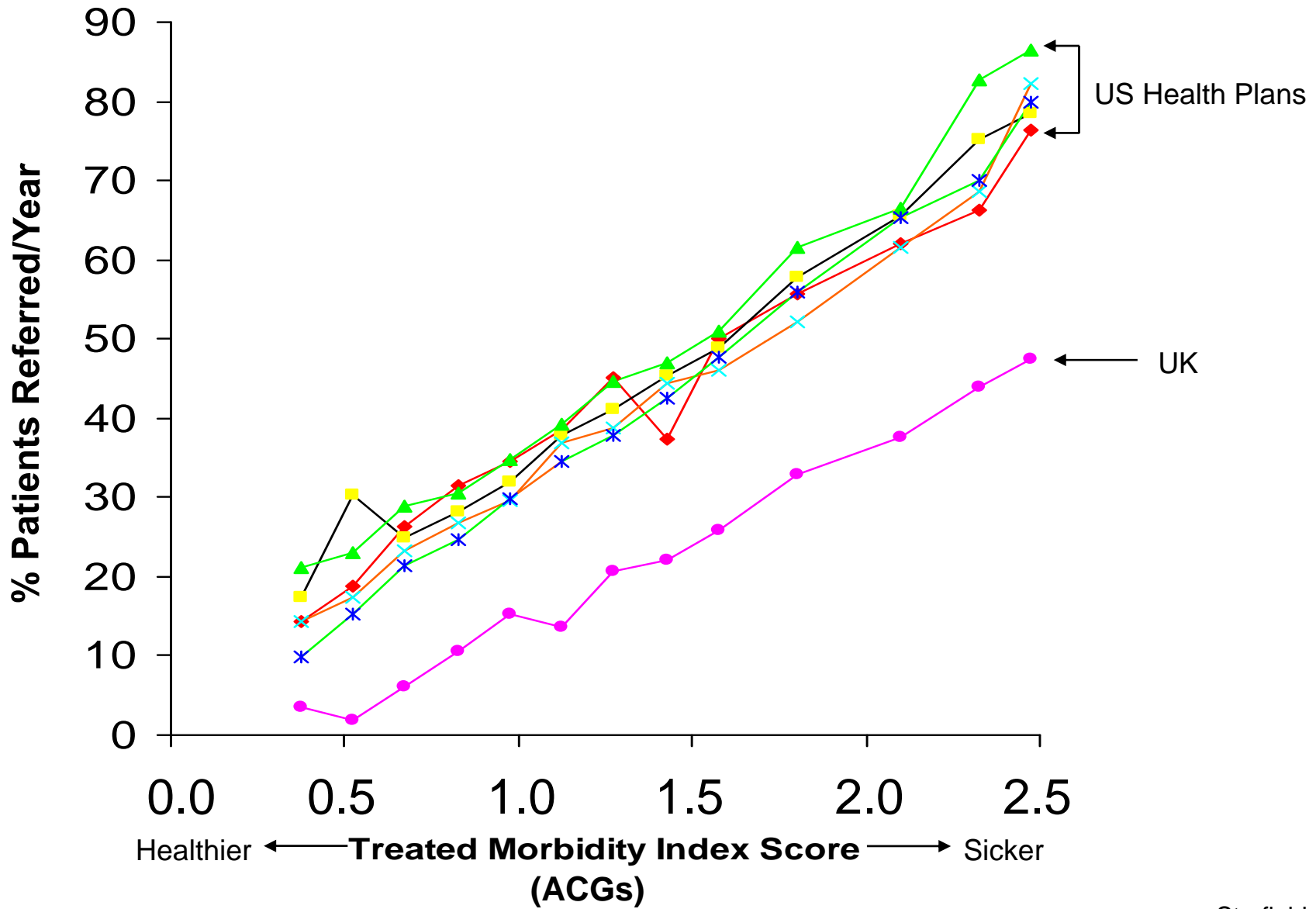


Source: National Physician Database, CIHI, as summarized in Canadian Institute for Health Information, The Evolving Role of Canada's Fee-for-Service Family Physicians, 1994-2003: Provincial Profiles, 2006.

Starfield 02/09  
COMP 7093 n

# The Appropriate Management of Multimorbidity in Primary Care

# Percentage of Patients Referred in a Year: US vs. UK



Source: Forrest et al, BMJ 2002; 325:370-1.

# Top 5 Predictors of Referrals, US Collaborative Practice Network, 1997-99

All referrals	Discretionary referrals†
High comorbidity burden	Patient ages 0-17*
Uncommon primary diagnosis	Nurse referrals permitted
Moderate morbidity burden	Northeast region
Surgical diagnoses	Physician is an internist.
Gatekeeping	Gatekeeping with capitation**

NOTE:

\* No pediatricians included in study

\*\* Specialists not in capitation plan

†Common conditions + high certainty for diagnosis and treatment + low cogency + only cognitive assistance requested. Constituted 17% of referrals.

The more common the condition in primary care visits, the less the likelihood of referral, even after controlling for a variety of patient and disease characteristics.

When comorbidity is very high, referral is more likely, even in the presence of common problems.

**IS THIS APPROPRIATE? IS SEEING A MULTIPLICITY OF SPECIALISTS THE APPROPRIATE STRATEGY FOR PEOPLE WITH HIGH COMORBIDITY?**

# Percent Distribution by Degree of Comorbidity for Selected Disease Groups, Non-elderly Population

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<b>Disease Group</b>	<b>Comorbidity Level (RUBs)</b>		
	<b>Low</b>	<b>Mid</b>	<b>High</b>
Total population	69.0*	27.5	4.0
Asthma	24.0	63.8	12.2
Hypertension	20.7	65.4	13.9
Ischemic heart disease	3.9	49.0	47.1
Congestive heart failure	2.6	35.1	62.3
Disorders of lipid metabolism	17.6	69.9	12.5
Diabetes mellitus	13.9	63.2	22.9
Osteoporosis	11.1	50.0	38.9
Thrombophlebitis	12.2	53.8	33.9
Depression, anxiety, neuroses	8.1	66.3	25.6

\*About 20% have no comorbidity.

Source: ACG Manual

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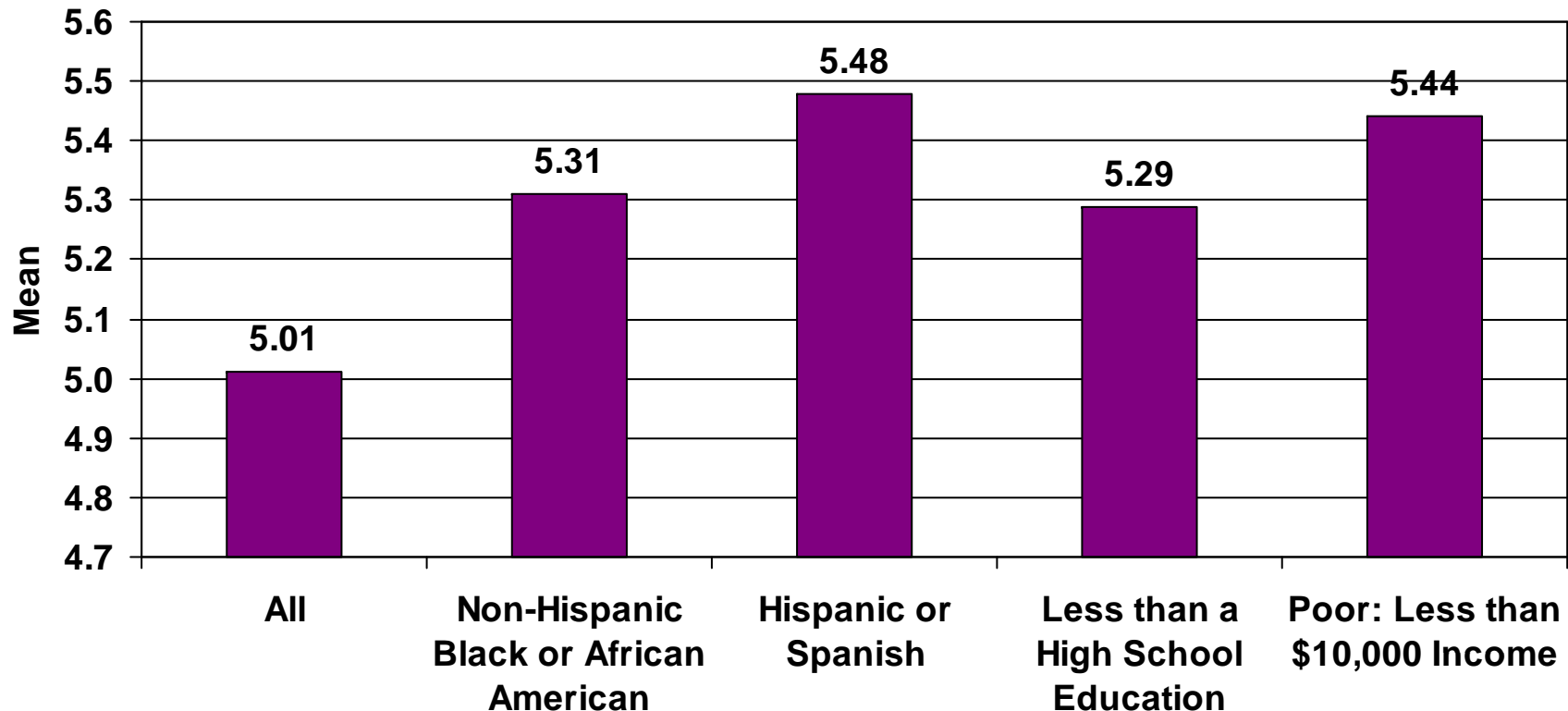
# Comorbidity Prevalence

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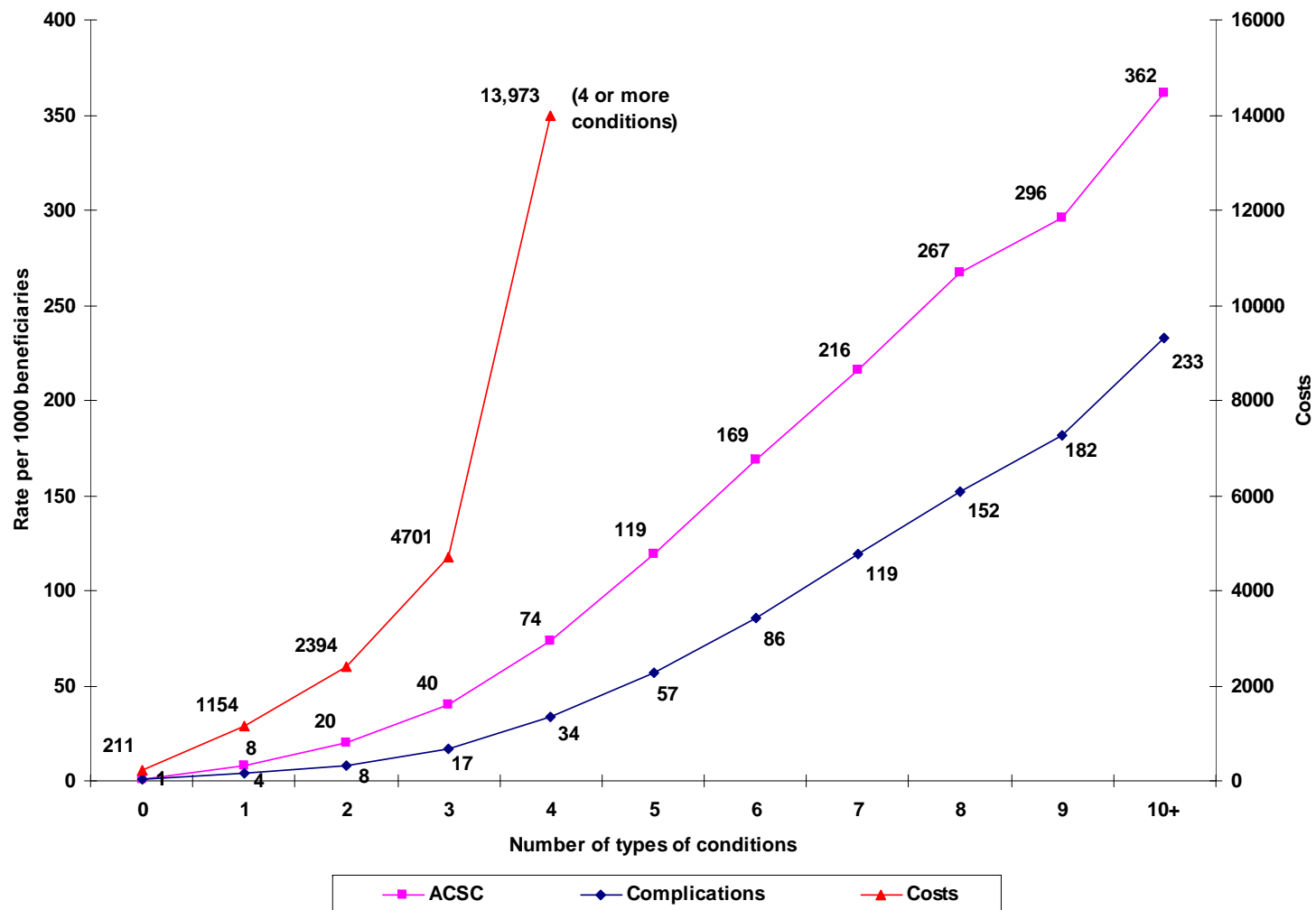
1. The percentage of Medicare beneficiaries with 5+ treated conditions increased from 31 to 40 to 50 in 1987, 1997, 2002.
2. The age-adjusted prevalence increased for
  - Hyperlipidemia: 2.6 to 10.7 to 22.2
  - Osteoporosis: 2.2 to 5.2 to 10.3
  - Mental disorders: 7.9 to 13.1 to 19.0
  - Heart disease: 27.0 to 26.1 to 27.8
3. The percentage of those with 5+ treated conditions who reported being in excellent or good health increased from 10% to 30% between 1987 and 2002.

MESSAGE: “Discretionary diagnoses” are increasing in prevalence, particularly those associated with new pharmaceuticals. How much of this is appropriate?

# Differences in Mean Number of Chronic Conditions among Enrollees Age 65+ Reporting Congestive Heart Failure, by Race/Ethnicity, Income, and Education: 1998



# Comorbidity, Inpatient Hospitalization, Avoidable Events, and Costs\*



Source: Wolff et al, Arch Intern Med 2002; 162:2269-76.

\*ages 65+, chronic conditions only

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Controlled for morbidity burden\*:

The more DIFFERENT generalists seen: higher total costs, medical costs, diagnostic tests and interventions.

The more different generalists seen, the more DIFFERENT specialists seen among patients with high morbidity burdens. The effect is independent of the number of generalist visits. That is, the benefits of primary care are greatest for people with the greatest burden of illness.

\*Using the Johns Hopkins Adjusted Clinical Groups (ACGs)

Source: Starfield et al, J Ambul Care Manage 2009;32:216-25.

Starfield 02/10  
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# Resource Use, Controlling for Morbidity Burden\*

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The more DIFFERENT specialists seen, the higher total costs, medical costs, diagnostic tests and interventions, and types of medication.

# Summary of Predictability of Year 1 Characteristics, with Regard to Subsequent Year's (3 or 5) Costs

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	Rank for relative risk	Under- predictive*	Over- predictive
1+ hospitalizations	5	90%	40%
8+ morbidity types (ADGs)	2	64%	55%
4+ major morbidity types (ADGs)	1	75%	30%
Top 10th percentile for costs	4	96%	70%
10+ specific diagnoses	3	82%	40%

\*Underpredictive: % of those with subsequent high cost who did not have the characteristic

Overpredictive: % with characteristic who are not subsequently high cost

# Influences\* on Use of Family Physicians and Specialists, Ontario, Canada, 2000-1

Type of influence	Primary care visits			Specialty visits		
	Mean	Median	One or more	Mean	Median	One or more
# different types of morbidity (ADGs)	1	1	1	1	1	1
Morbidity burden (ACG RUBs)	2	2	2	2	2	2
Self-rated health	3	3	5	3	-	5
Disability	4	4	4	4	4	4
# chronic conditions**	5	5	3	-	-	-
Age 65 or more	-	-	-	5	3	3

\*top five, in order of importance

\*\*from a list of 24, including “other longstanding conditions”

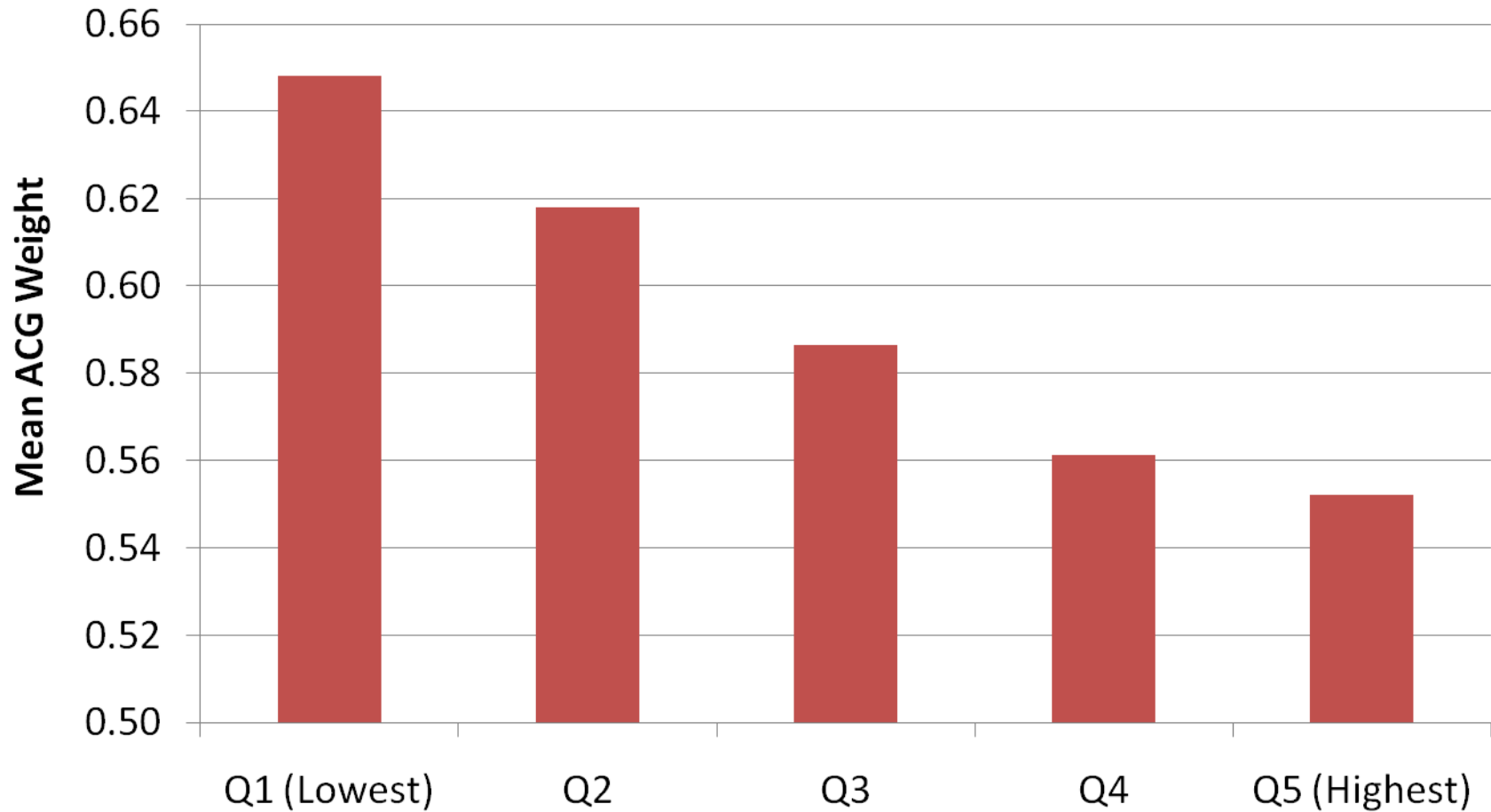
# Expected Resource Use (Relative to Adult Population Average) by Level of Comorbidity, British Columbia, 1997-98

	None	Low	Medium	High	Very High
Acute conditions only	0.1	0.4	1.2	3.3	9.5
Chronic condition	0.2	0.5	1.3	3.5	9.8
High impact chronic condition	0.2	0.5	1.3	3.6	9.9

Thus, it is comorbidity, rather than presence or impact of chronic conditions, that generates resource use.

# Results: Case-mix by SES - ACG

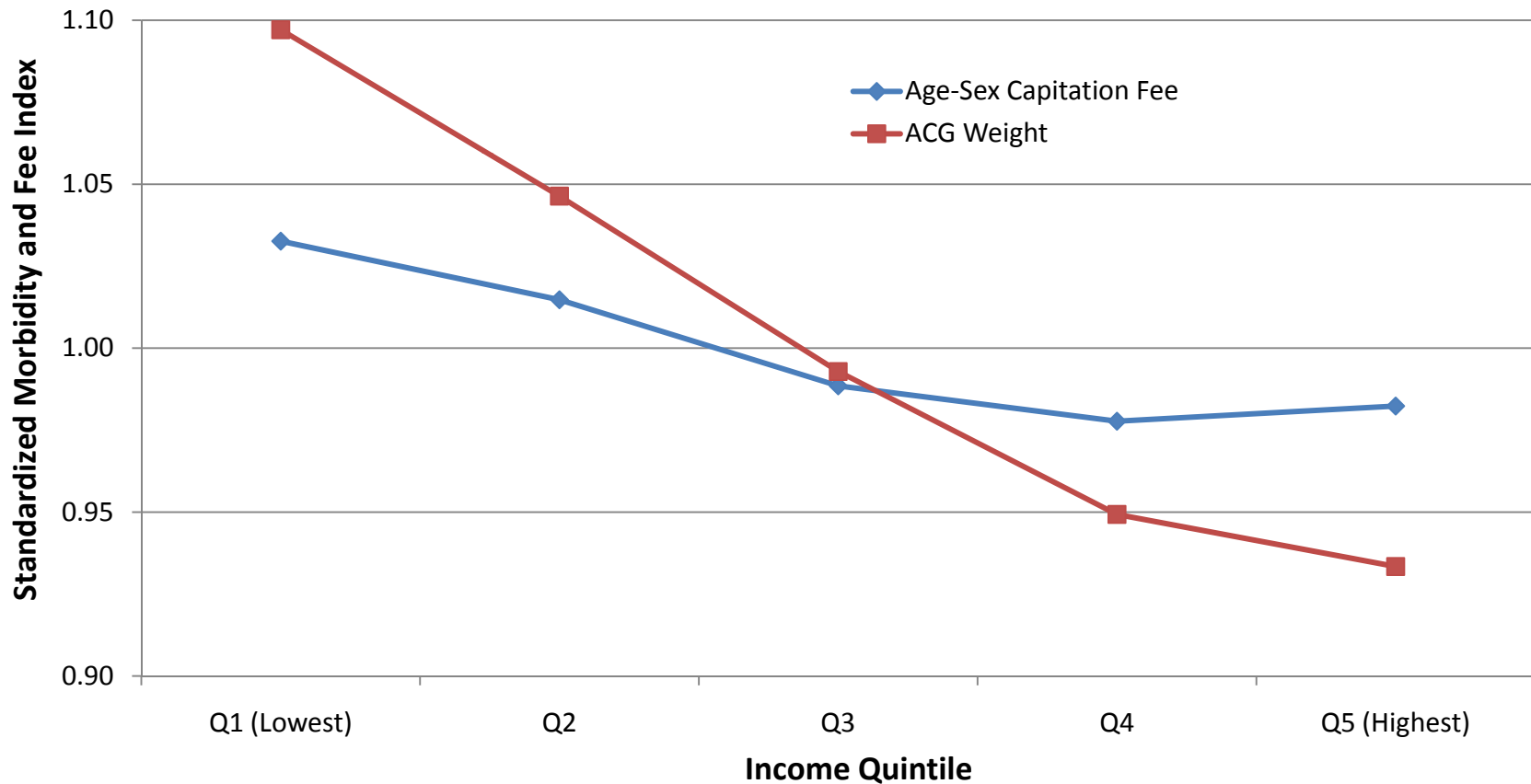
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Source: Sibley L, Family Health Networks, Ontario 2005-06.

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# Results: Capitation Fee and Morbidity by SES



Source: Sibley L, Family Health Networks, Ontario 2005-06.

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# Methods (I)

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- Representative sample of 66,500 adults (age 18 or older) enrolled in Clalit Health Services (Israel's largest health plan) during 2006
- Data from diagnoses registered in electronic medical records during all encounters (primary, specialty, and hospital), and health care use registered in Clalit's administrative data warehouse

# Methods (II)

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- Morbidity spectrum: ADGs were used to classify the population into 3 groups:
  - Low (0-2 ADGs)
  - Medium (3-5 ADGs)
  - High ( $\geq 6$  ADGs)
- Clalit's Chronic Disease Registry (CCDR):
  - ~180 diseases. Based on data from diagnoses, lab tests, Rx
- Charlson Index:
  - Based on data from the CCDR
  - Range 0-19

# Methods (III)

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## Resource use:

- Costs: total, hospital, ambulatory (standardized price X unit)
- Specialist visits
- Primary care physician visits
- Resource use ratio: mean total cost per morbidity group divided by the average total cost

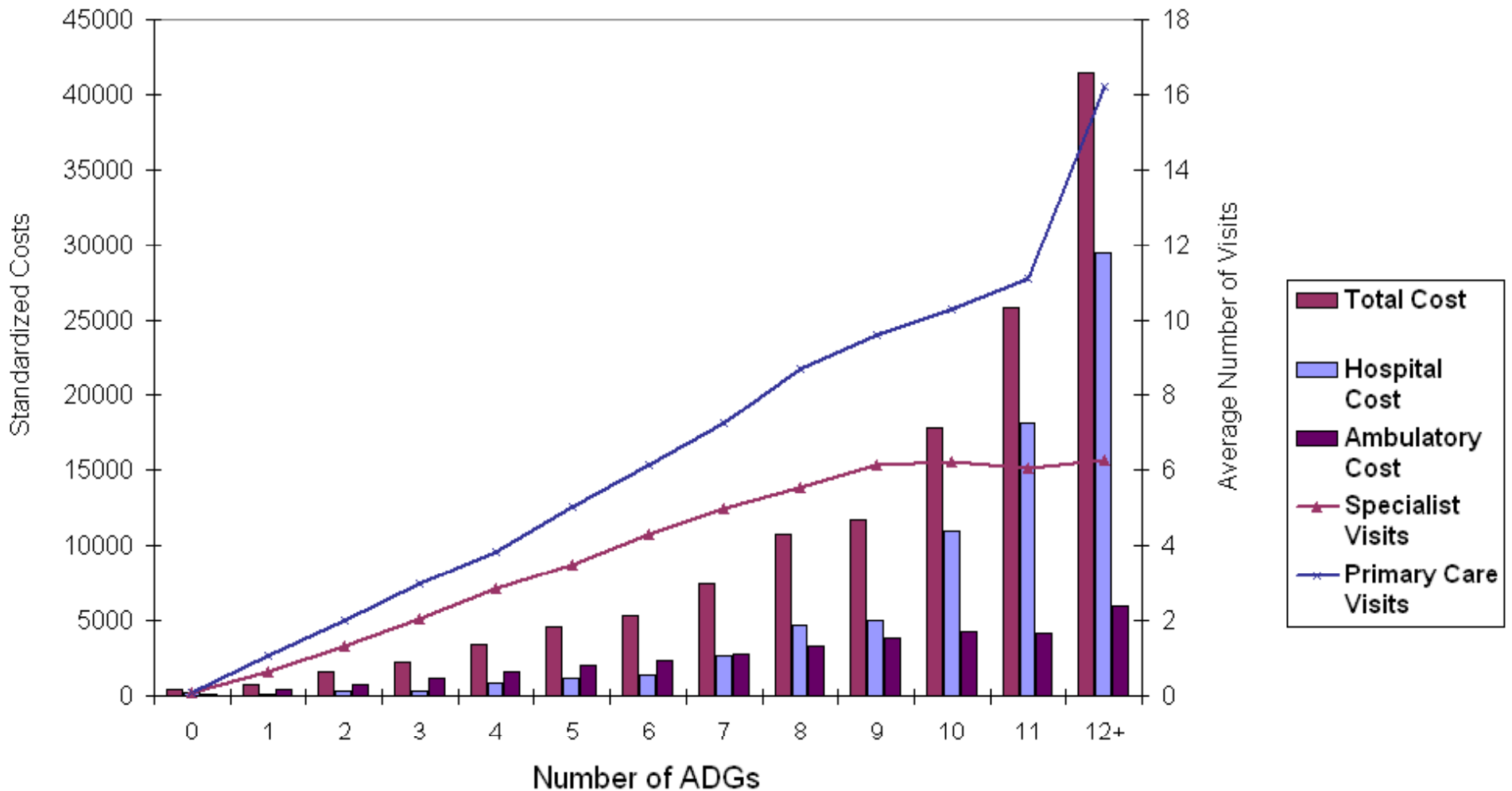
# Resource Use in Adults with No Chronic Condition

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14% of persons with no chronic conditions have an average resource use ratio higher than that of some of the people with 5 or more chronic conditions.

That is, resource use in populations is not highly related to having a chronic condition, in the absence of consideration of other conditions.

# Resource Use by Spectrum of Morbidity: Adults with No Chronic Conditions (N=28,700)



Source: Shadmi et al, Morbidity pattern and resource use in adults with multiple chronic conditions, presented 2010.

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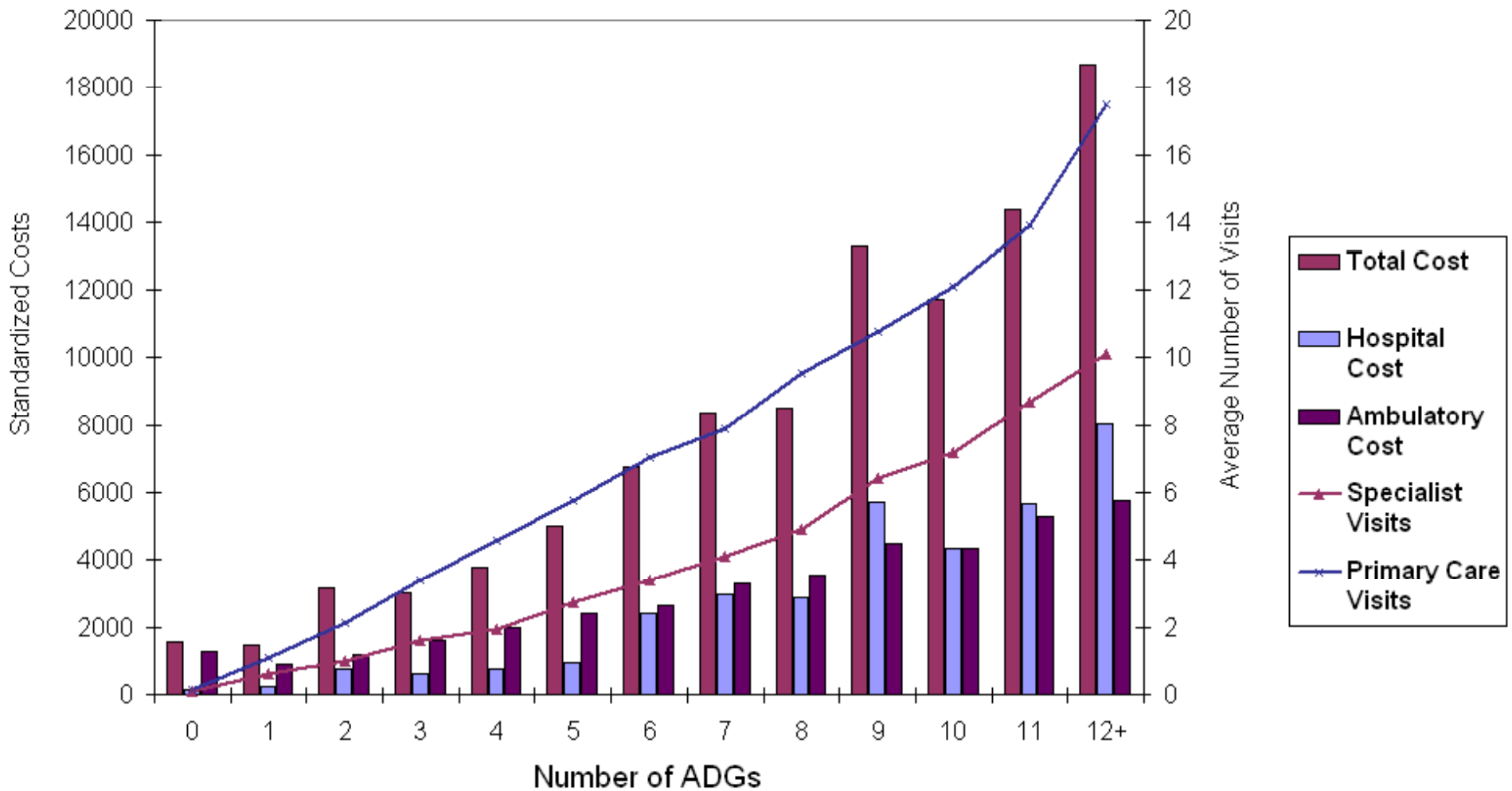
# Resource Use in Adults with Chronic Conditions

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- Some people with as many as 6 chronic conditions have less than average resource use
- Prevalent conditions in persons with 6 chronic diseases and below average resource use:
  - 60% hyperlipidemia
  - 32% diabetes
  - 27% obesity
  - 10% hypertension
  - 10% depression

That is, resource use is more highly related to the types of co-morbidity than to specific chronic conditions.

# Resource Use by Spectrum of Morbidity: Persons with 3 Chronic Conditions (N=4,900)



Source: Shadmi et al, Morbidity pattern and resource use in adults with multiple chronic conditions, presented 2010.

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# Morbidity Spectrum Explains Health Care Resource Use (R<sup>2</sup>)

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	Total cost*	Hospital costs*
Age, sex	12%	6%
Chronic condition count, age, sex	20%	9%
Charlson, age, sex	22%	12%
ADG, age sex	42%	27%

\*Total costs: Hospital, ambulatory and Rx costs trimmed at 3 standard deviations above the mean.

# Chronic Conditions and Use of Resources

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## Implications for care management:

- Care management based on selection of patients based on chronic disease counts (e.g., persons with 4 or more chronic conditions) will include many “false positives” (i.e., persons with low morbidity burden and low associated resource use) and will miss many who could benefit from such interventions.
- Implications for research:
  - Adjustment for morbidity based on chronic condition counts or the Charlson score fails to capture the morbidity burden of 40-60% of the population.
  - Adjustments using chronic condition counts or the Charlson score explain only half or less of the variance explained by ADGs (morbidity spectrum).

# Applications of Morbidity-Mix Adjustment

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1. Physician/group oriented
  - Characterizing and explaining variability in resource use
  - Understanding the use of and referrals to specialty care
  - Controlling for comorbidity
  - Capitation payments
  - Refining payment for performance
2. Patient/population oriented
  - Identifying need for tailored management in population subgroups
  - Surveillance for changes in morbidity patterns
  - Targeting disparities reduction

# Choice of Comorbidity Measure Depends on the Purpose

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- population morbidity assessments
- prediction of death
- prediction of costs
- prediction of need for primary care services
- prediction of use of specialty services

The US is focused heavily on costs of care. Therefore, it focuses in measures for predicting costs and predicting deaths.

A primary care-oriented health system would prefer a measure of predicting need for and use of specialty services.

# Multimorbidity and Use of Primary and Secondary Care Services

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- Morbidity and comorbidity (and hence multimorbidity) are increasing.
- Specialist use is increasing, especially for routine care.
- The appropriate role of specialists in the care of patients with different health levels and health needs is unknown.

# We know that

1. Inappropriate referrals to specialists lead to greater frequency of tests and more false positive results than appropriate referrals to specialists.
2. Inappropriate referrals to specialists lead to poorer outcomes than appropriate referrals.
3. The socially advantaged have higher rates of visits to specialists than the socially disadvantaged.
4. The more the training of MDs, the more the referrals.

**A MAJOR ROLE OF PRIMARY CARE IS TO ASSURE THAT SPECIALTY CARE IS MORE APPROPRIATE AND, THEREFORE, MORE EFFECTIVE.**

What is the right number of  
specialists?

What do specialists do?

What do specialists contribute  
to population health?

# What We Do Not Know

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The contribution of specialists to

- Unnecessary care (due to overestimation of the likelihood of disease)
- Potentially unjustified care (due to inappropriateness of guidelines when there is comorbidity)
- Adverse effects (from the cascade effects of excessive diagnostic tests)

# What We Need to Know

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- What specialists contribute to population health
- The optimum ratio of specialists to population
- The functions of specialty care and the appropriate balance among the functions
- The appropriate division of effort between primary care and specialty care
- The point at which an increasing supply of specialists becomes dysfunctional

Interest in predicting and controlling costs (through “risk management” and “predictive modeling”) is not the only impetus for a morbidity-mix measure.

A morbidity-mix measure is useful for describing and understanding variability in impact on health of

- Referrals
- Use of medications
- Use of diagnostic and therapeutic modalities
- Disease-oriented guidelines
- Appropriateness of payment for performance

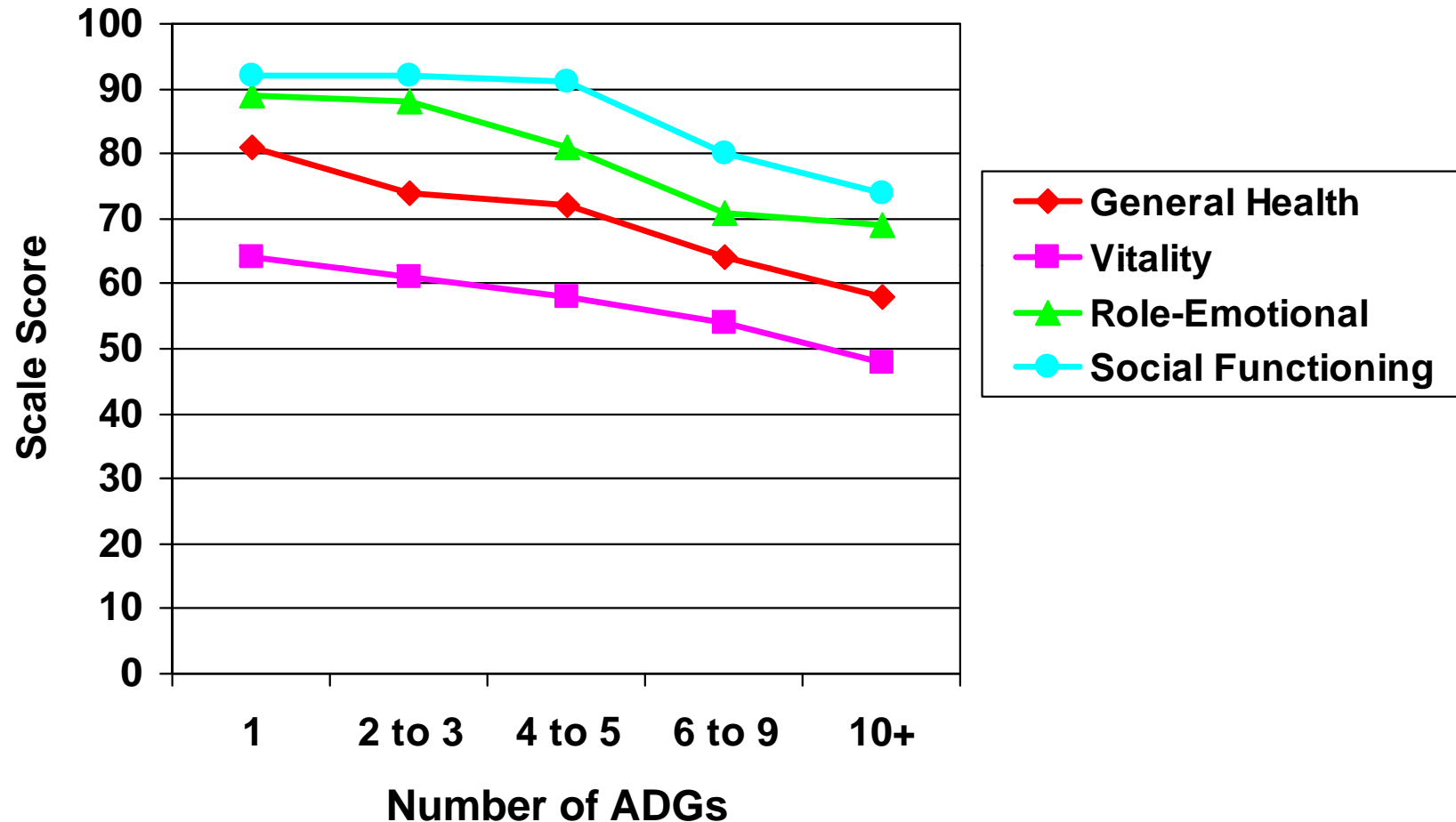
The innovative medical manager will consider variations in resource use in the context of morbidity mix in the population. It is not only a challenge for optimization of resources but, also, a challenge to progress in understanding the need for and impact of health services on health, particularly with regard to

- Occurrence of adverse effects
- Difference in procedures and outcomes in different population groups (e.g., inequities/disparities)
- Referrals to and use of specialist services
- Use and misuse of diagnostic tests and procedures
- Management interventions



When patients' visits to specialists are based on a primary care physician referral, patients report much better coordination of care, i.e., better informed primary care physician, better primary care physician follow-up, than is the case when patients self-refer or are referred by some other source.

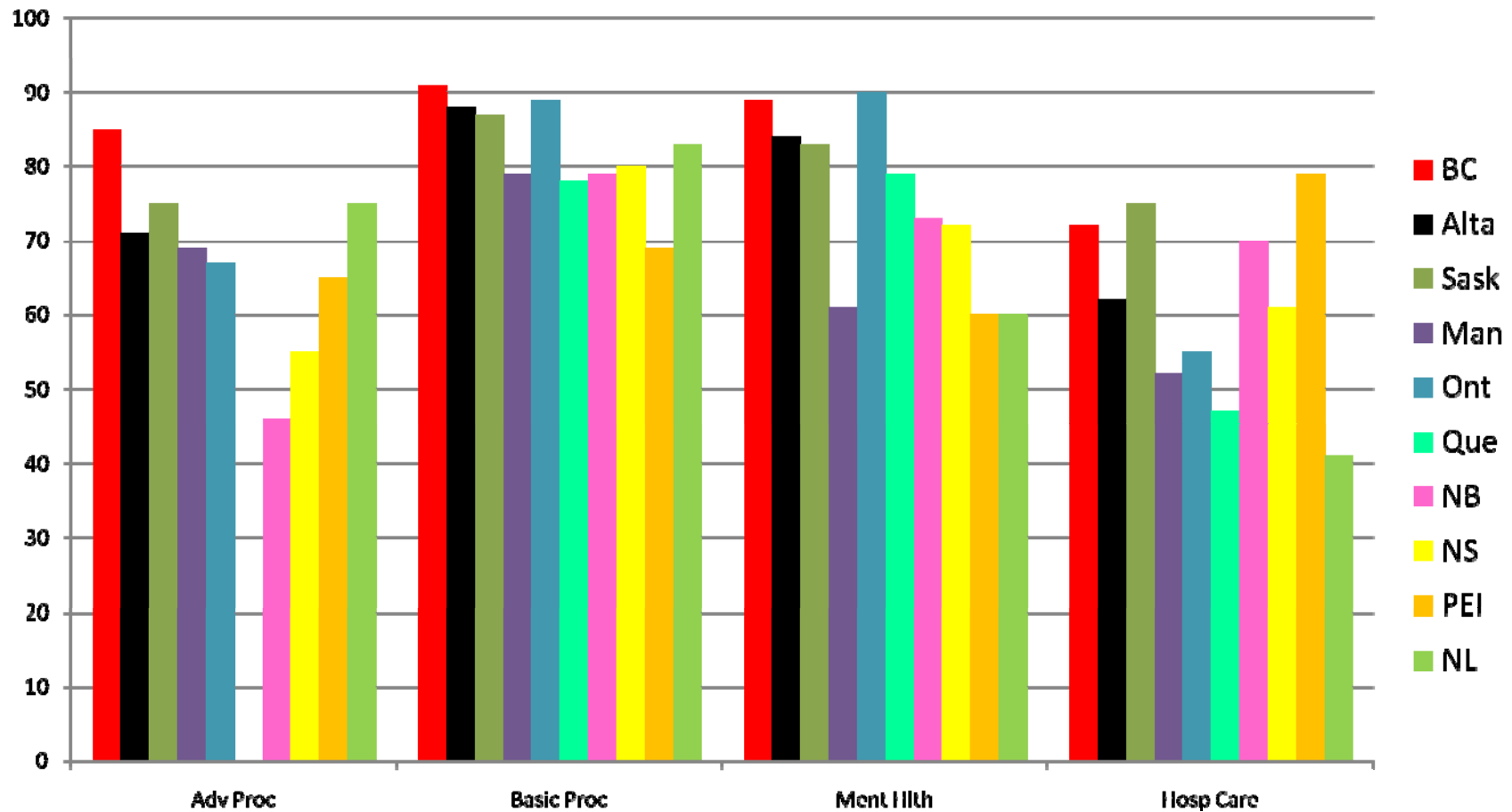
# Number of ADGs by SF-36 Scores



Source: Fowles et al, JAMA 1996; 276:1316-21 (for 1 year).  
Corroborated by Sibley et al, Med Care 2010;48:175-82, for a 2-year period.

Starfield 08/03  
CM 6081 n

# Provincial Participation Rates of Canadian Fee-for-Service Family Physicians in: In-Hospital Care, Mental Health Care, Advanced and Basic Procedural Skills



Source: Canadian Institute for Health Information. The Evolving Role of Canada's Fee-for-Service Family Physicians, 1994-2003: Provincial Profiles. 2006.

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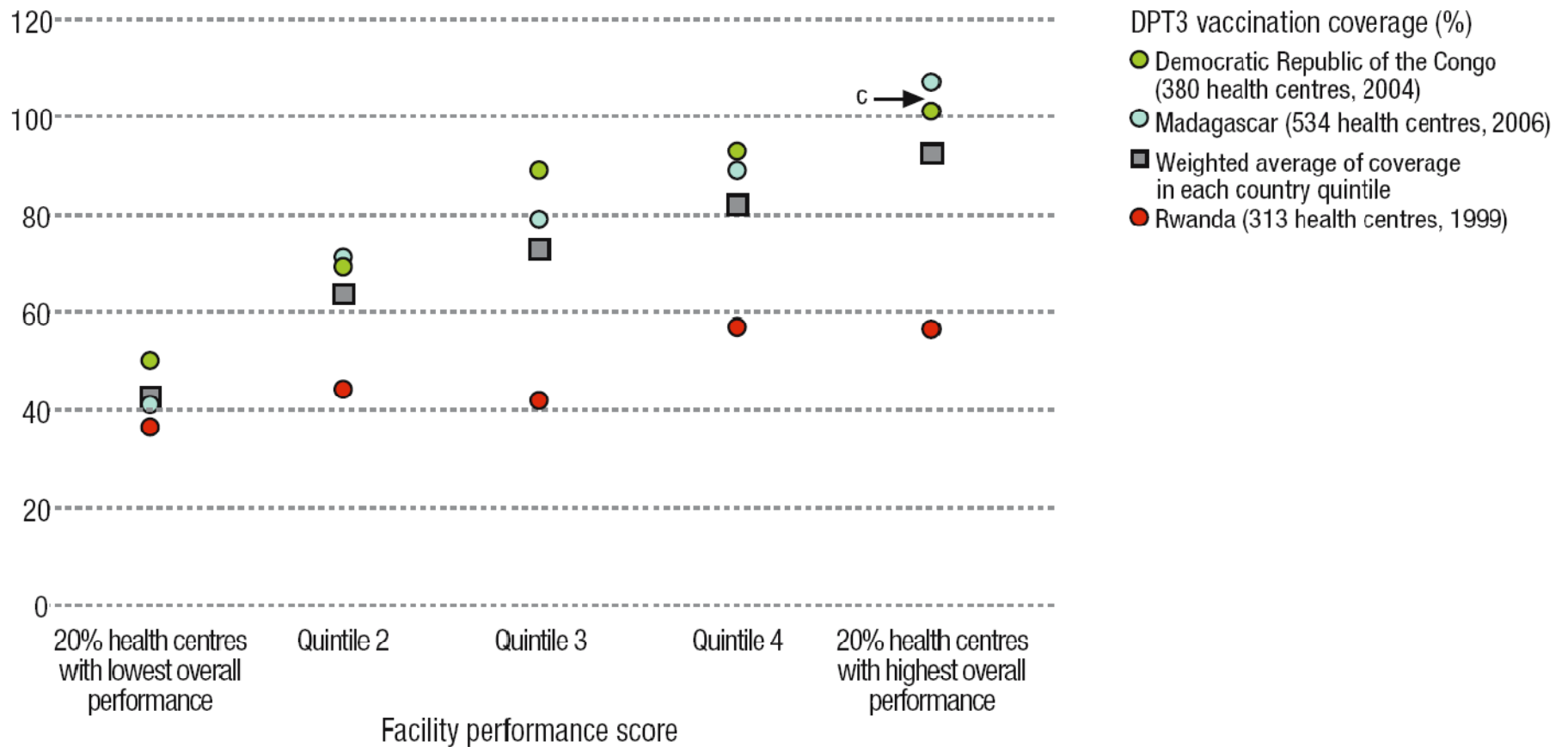
# Breadth of Family Medicine

<b>Specialty</b>	<b># of presenting problems accounting for 50% of all visits</b>	<b>Percentage of all visits accounted for by the 50 most frequent presenting problems</b>
<b>Family/GP</b>	<b>26</b>	<b>64</b>
<b>Internal med</b>	<b>22</b>	<b>67</b>
<b>Peds</b>	<b>7</b>	<b>85</b>
<b>Cardiology</b>	<b>9</b>	<b>88</b>
<b>Derm</b>	<b>6</b>	<b>94</b>
<b>General surg</b>	<b>18</b>	<b>72</b>
<b>OB/gyn</b>	<b>3</b>	<b>90</b>
<b>Ophtho</b>	<b>5</b>	<b>97</b>
<b>Ortho</b>	<b>11</b>	<b>87</b>
<b>Urology</b>	<b>11</b>	<b>91</b>
<b>Psych</b>	<b>2</b>	<b>98</b>
<b>Neuro</b>	<b>9</b>	<b>88</b>

Source: Starfield. Primary Care: Balancing Health Needs, Services, and Technology. Oxford U. Press, 1998.

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# More Comprehensive Health Centres Have Better Vaccination Coverage<sup>a,b</sup>



<sup>a</sup> Total 1227 health centres, covering a population of 16 million people.

<sup>b</sup> Vaccination coverage was not included in the assessment of overall health-centre performance across a range of services.

<sup>c</sup> Includes vaccination of children not belonging to target population.

# Increase in Treated Prevalence and Costs: Selected Conditions, US, People with Private Insurance

Condition	Percentage Change, 1987-2002	
	in Treated Prevalence	in Spending Due to Change in Treated Prevalence**
Hyperlipidemia	437	89
Bone problems	227	92
Upper GI problems	169	107
Cerebrovascular disease	161	167
Mental problems	136	126
Newborn/maternal care	-14	-21
Infectious diseases	-1	-2
Heart disease	9	92
Bronchitis	13	-36
Endocrine disorders	24	58

**\*\*Ratio of % spending growth linked to rise in treated prevalence/percent linked to treated prevalence + cost per case combined.**

**Figures over 100 indicate that cost per case declined.**

**Negative figures indicate a high relative increase in cost per case.**

Higher comprehensiveness scores in primary care\* are associated with better coordination between primary care and other specialists.

\*number of medical procedures performed; presence of occupational and physical therapists

# Scores for Average Total Primary Care, Primary Care (Clinical), Primary Health Care (Systems), and Comprehensiveness

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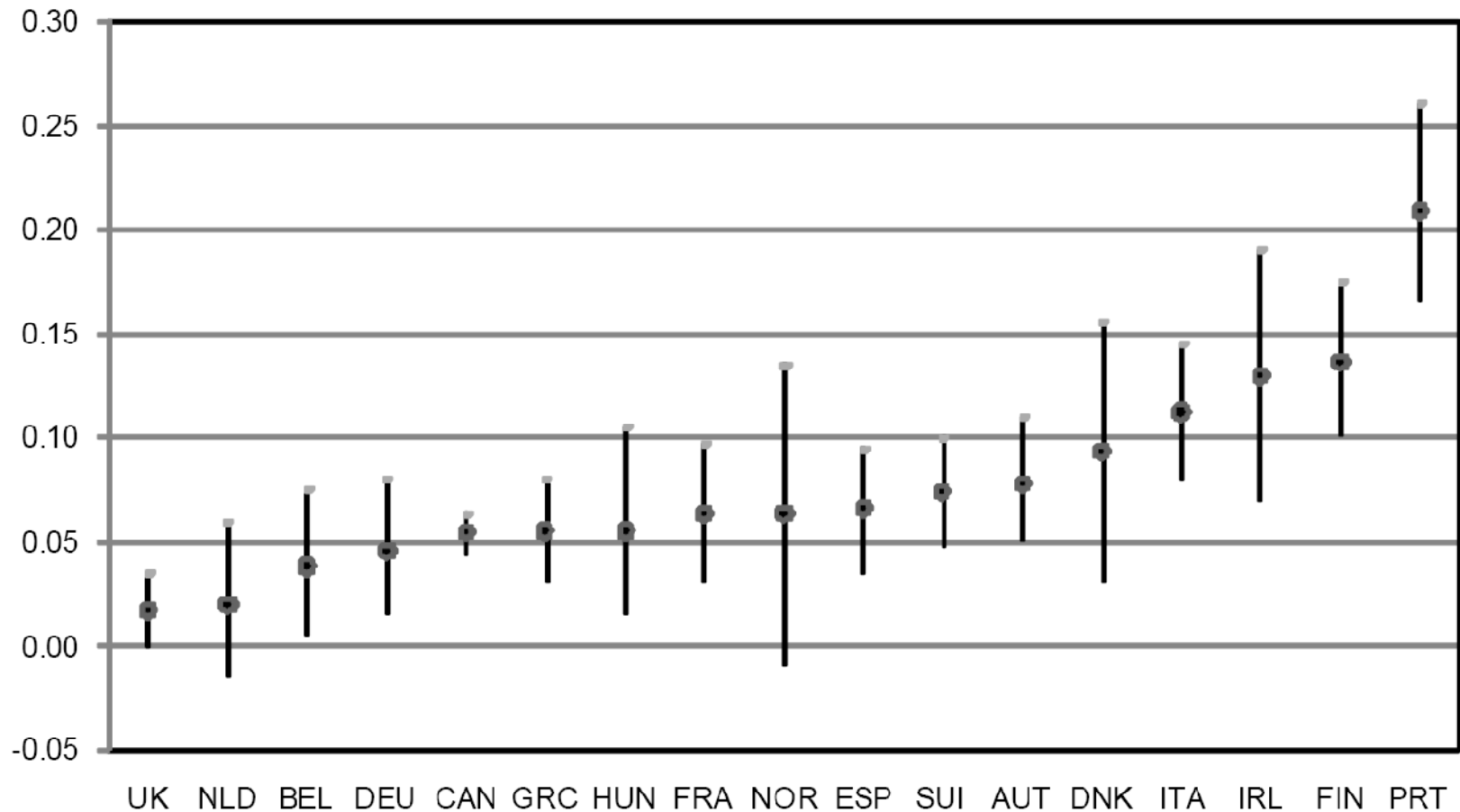
	Average total primary care	Primary care (clinical)	Primary health care (systems)	Comprehensiveness
BE, FR, GE, US	0.4	0.1	0.6	0.0
AU, CA, JP, SW	1.0	0.9	1.1	1.5
DE, FI, NE, SP, UK	1.6	1.5	1.7	1.8

# Percentage of People Seeing at Least One Specialist in a Year

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US	40% of total population; 54% of patients (users)
Canada (Ontario)	31% of population (68% at ages 65 and over)
UK	about 15% of patients (at ages under 65)
Spain	30% of population; 40% of patients (users)

## Horizontal Inequity Indices for Specialist Care Use in 17 Countries, 2000 or Nearest Available Year



Note: Specialist care is inequitable (in this case, favoring high income groups) if the 95% confidence limit is significantly different from zero. This is so for all countries, except the United Kingdom, the Netherlands, and Norway.

Sources: de Looper & Lafortune, OECD Health Working Paper No. 43

([http://www.ois.oecd.org/olis/2009doc.nsf/LinkTo/NT00000DE2/\\$FILE/JT03260782.PDF](http://www.ois.oecd.org/olis/2009doc.nsf/LinkTo/NT00000DE2/$FILE/JT03260782.PDF)).

van Doorslaer & Masseria, OECD Health Working Paper No. 14

(<http://fiordiliji.sourceoecd.org/vl=22046792/cl=47/nw=1/rpsv/cgi-bin/wppdf?file=5lgsjhvj7phb.pdf>).

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Specialty care in most industrialized countries (but especially in the US) is inequitably distributed. In contrast, primary care, EXCEPT in the US, is equitably distributed. That is, in the US in contrast to other comparable countries, health services are provided very inequitably, both for primary care and for specialty care.

Based on data from US for-profit health plans, \$73 billion could be saved from the costs of the insured population alone if just one “average” specialist visit were replaced by one primary care visit.

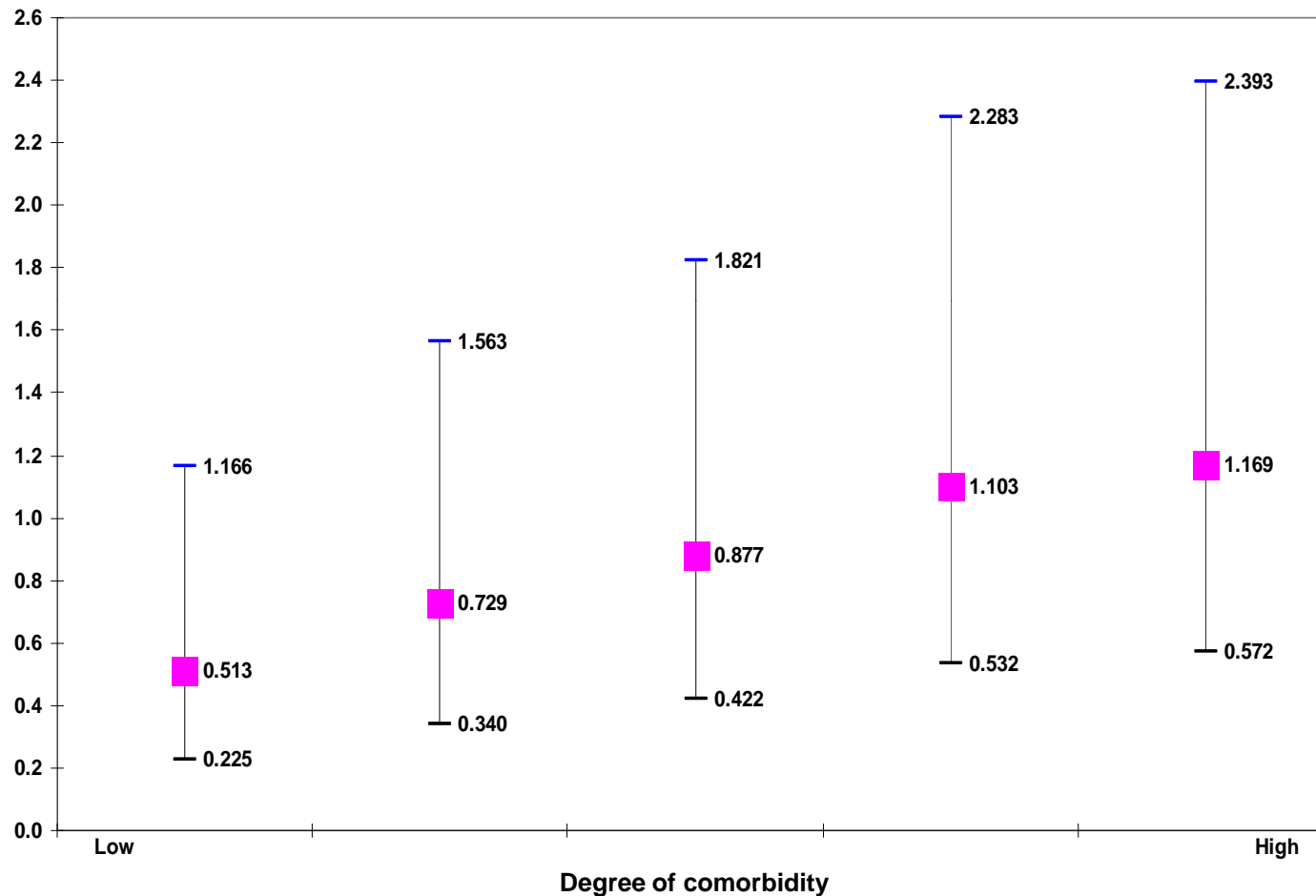
As about half of routine specialist visits are for “follow-up”, and better continuity of care within primary care could lead to fewer specialists visits. Aspects of healthcare reform that strengthen primary care to provide more comprehensive care and routine follow-up care after specialist visits could save enough money to insure the entire uninsured population.

# Percentage of Visits by Type of Visit and Specialty, US, 2004

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	New problem	Routine visit/followup	New patient	Recurrence of known problem	Other
Family physician	46	38	7	6	3
General internal medicine	34	50	7	6	3
Pediatrics	57	36	5	2	1

# Odds Ratios and Confidence Intervals for Persistence\* by Degree of Comorbidity: Urinary Tract Infection



\*controlled for age and sex

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# Generalists and Specialists per 100,000 People, US and Canada, 2006-7

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	US	Canada
Generalists (FP, GIM, general peds)	100	99
Specialists	207	94

# Aspects of Care That Distinguish Conventional Health Care from People-Centred Primary Care

<b>Conventional ambulatory medical care in clinics or outpatient departments</b>	<b>Disease control programmes</b>	<b>People-centred primary care</b>
Focus on illness and cure	Focus on priority diseases	Focus on health needs
Relationship limited to the moment of consultation	Relationship limited to programme implementation	Enduring personal relationship
Episodic curative care	Programme-defined disease control interventions	Comprehensive, continuous and person-centred care
Responsibility limited to effective and safe advice to the patient at the moment of consultation	Responsibility for disease-control targets among the target population	Responsibility for the health of all in the community along the life cycle; responsibility for tackling determinants of ill-health
Users are consumers of the care they purchase	Population groups are targets of disease-control interventions	People are partners in managing their own health and that of their community

# Percentage of Visits in Which Patients Were Referred: US

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	1994	2006
Family medicine	4	8
Internal medicine	8	12
Pediatrics	3	6
Other specialties	3	5

# Family Physicians, General Internists, and Pediatricians

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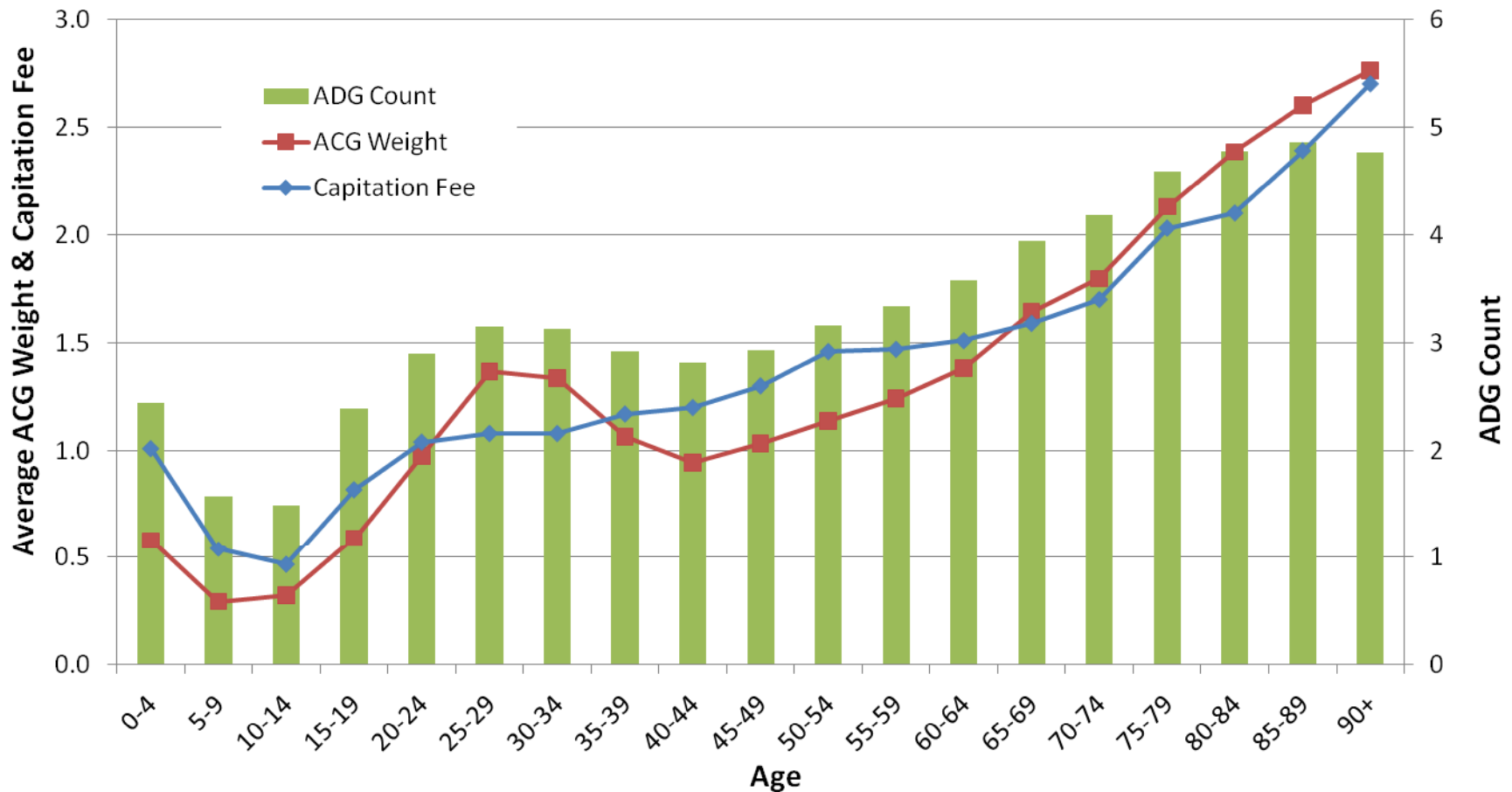
A nationally representative study showed that adults and children with a family physician (rather than a general internist, pediatrician, or sub-specialist) as their regular source of care had lower annual cost of care, made fewer visits, had 25% fewer prescriptions, and reported less difficulty in accessing care, even after controlling for case-mix, demographic characteristics (age, gender, income, race, region, and self-reported health status). Half of the excess is in hospital and ER spending; one-fifth is in physician payments; and one-third is for medications.

Having a general internist as the PCP is associated with more different specialists seen. Controlling for differences in the degree of morbidity, receiving care from multiple specialists is associated with higher costs, more procedures, and more medications, independent of the number of visits and age of the patient.

The greater the morbidity burden,  
the greater the persistence of any  
given diagnosis.

That is, with high comorbidity,  
even acute diseases are more  
likely to persist.

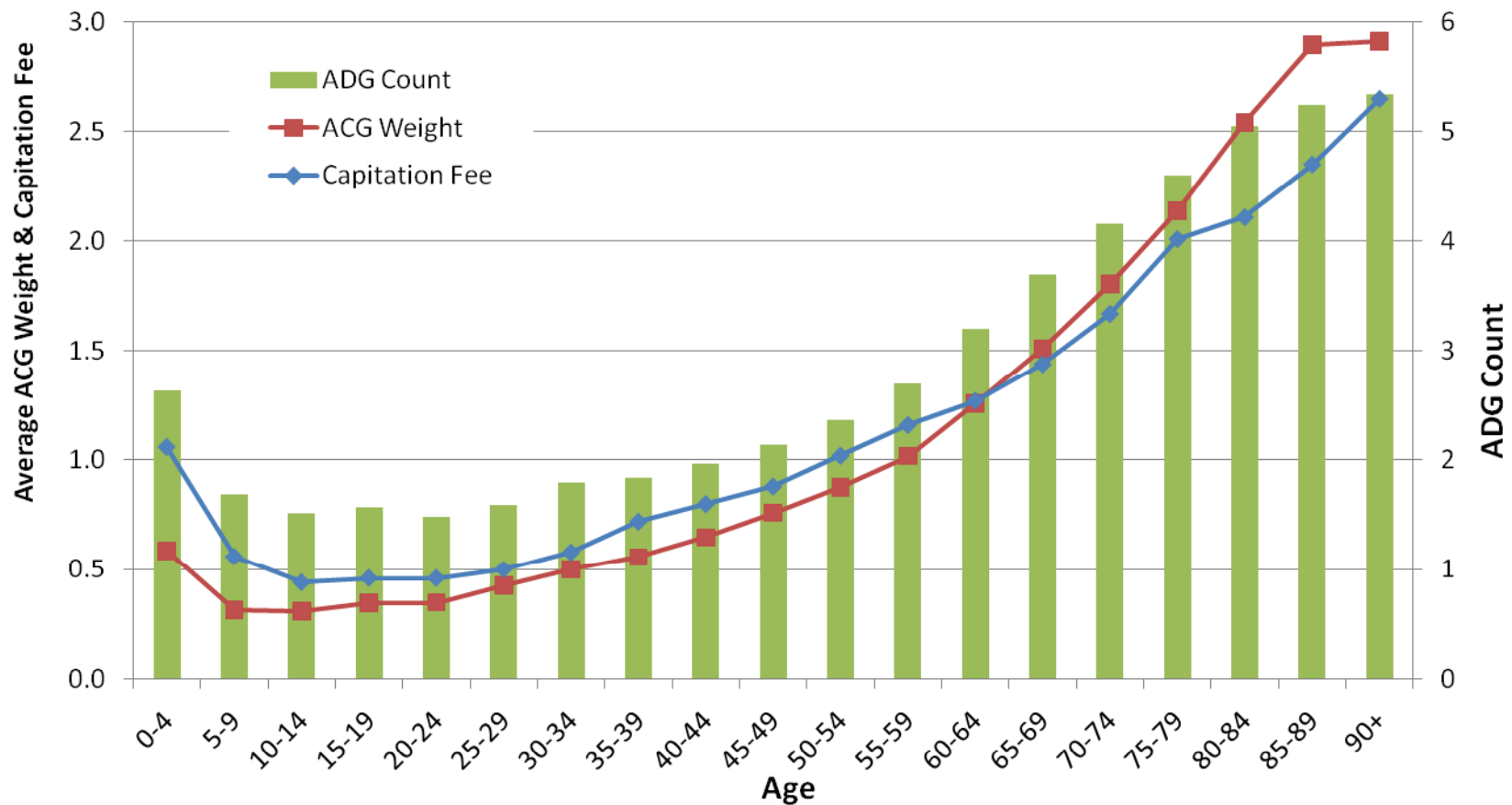
# Results: Case-mix of Age Groups – Females



Source: Sibley L, Family Health Networks, Ontario 2005-06.

Starfield 03/10  
CM 7323 n

# Results: Case-mix of Age Groups – Males

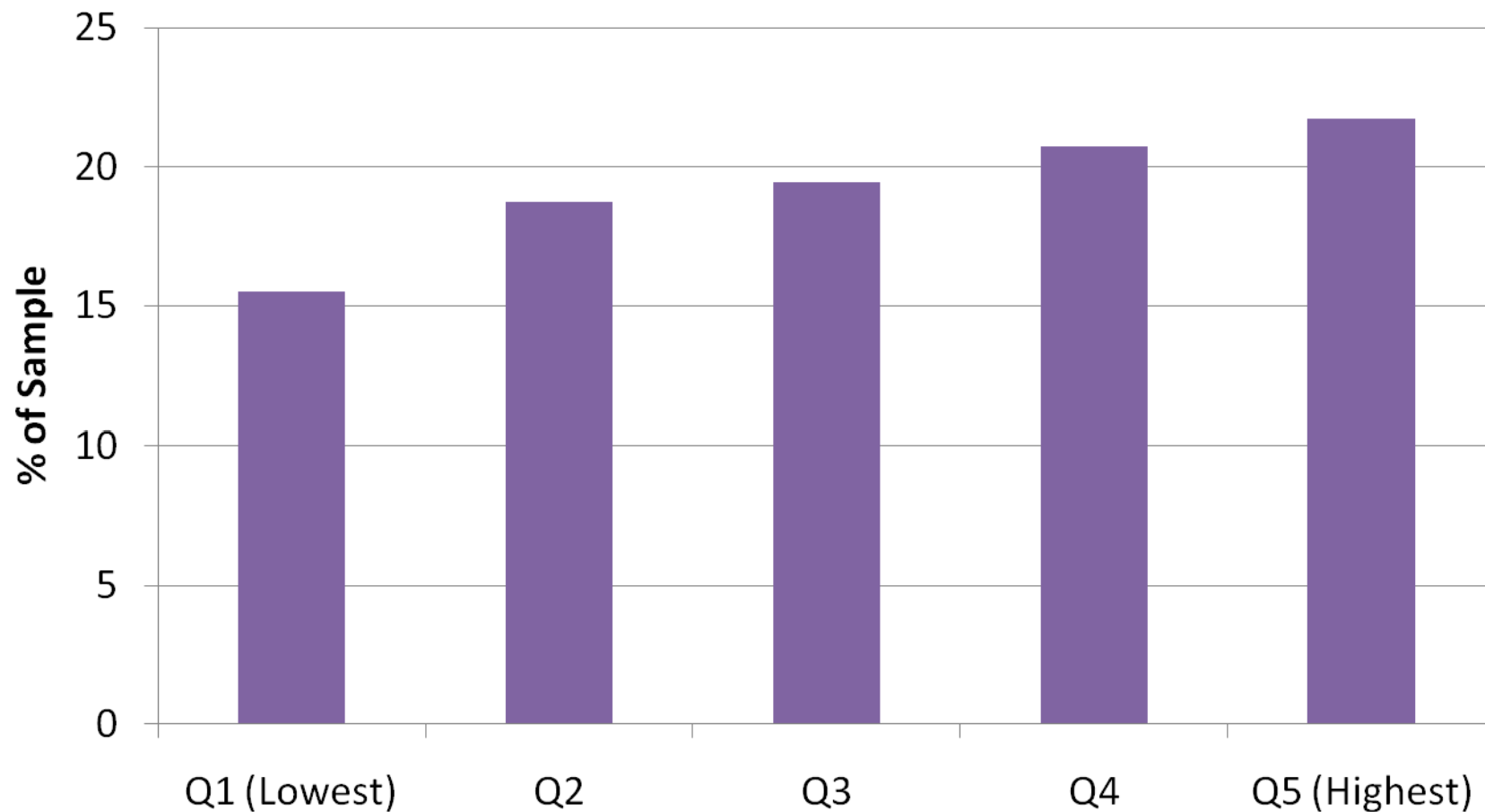


Source: Sibley L, Family Health Networks, Ontario 2005-06.

Starfield 03/10  
CM 7324 n

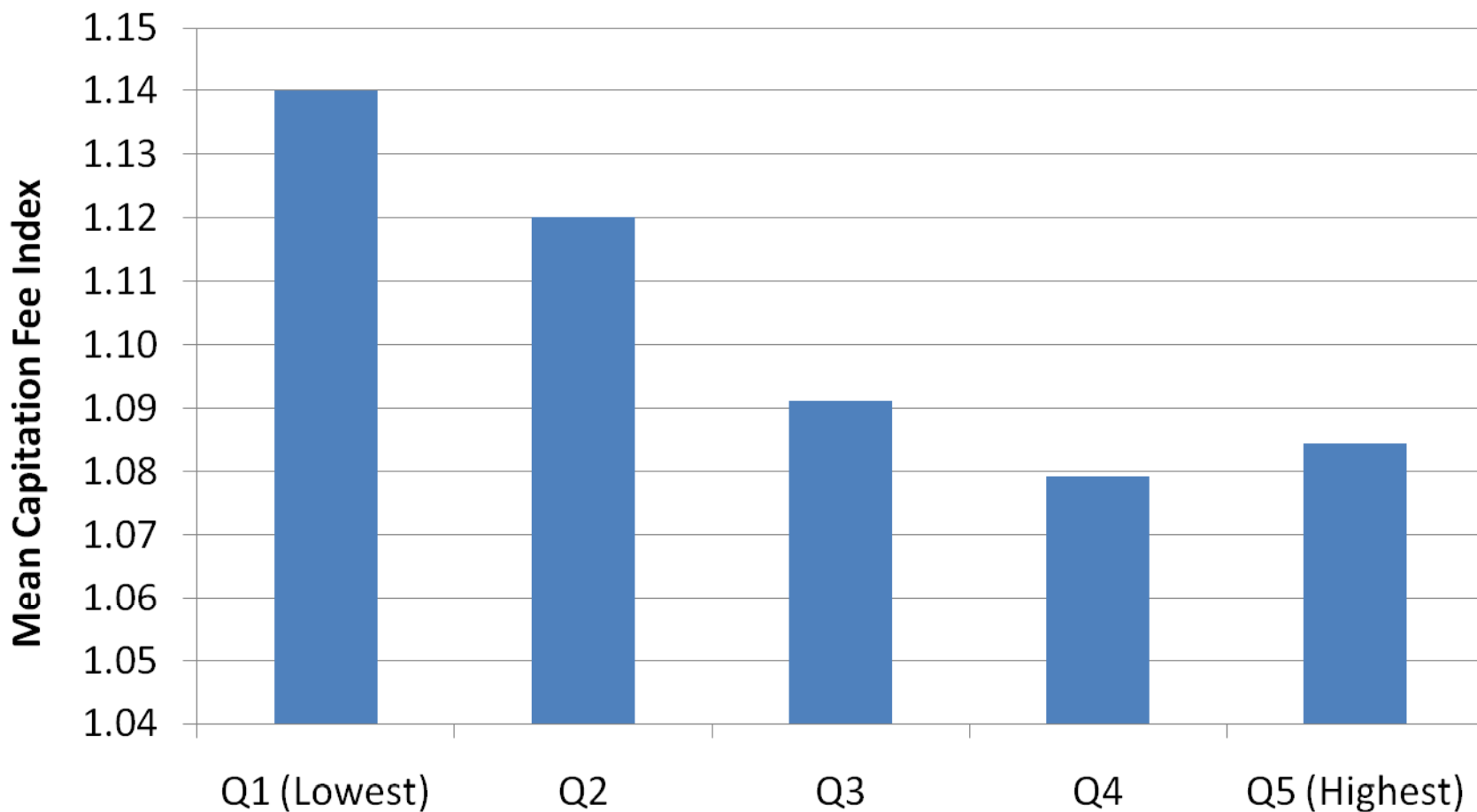
# Results: Income Quintiles

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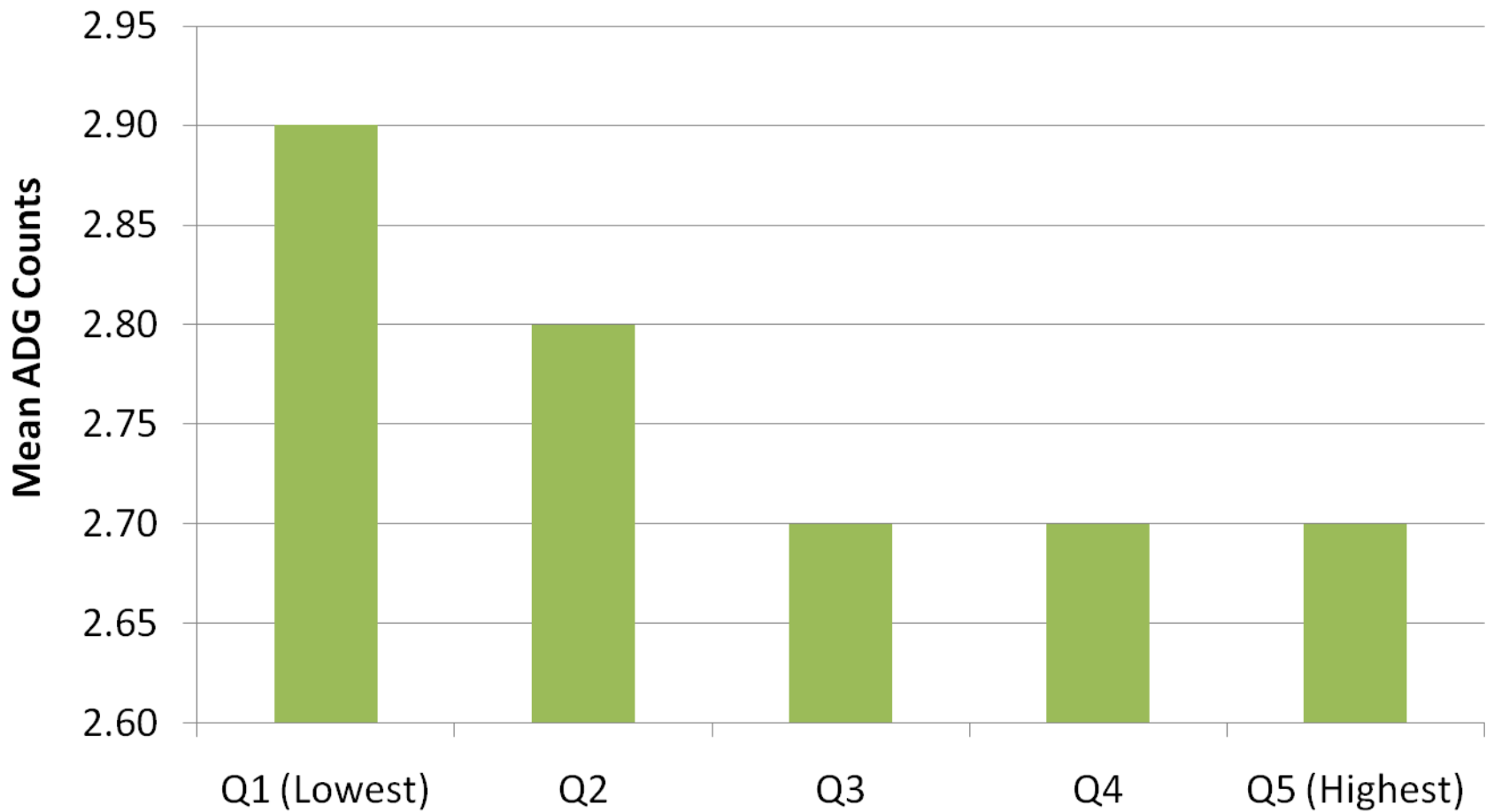
# Results: Capitation Fee by SES

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# Results: Case-mix by SES - ADG

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Source: Sibley L, Family Health Networks, Ontario 2005-06.

Starfield 03/10  
CM 7326 n

# CUSTOMIZING THE ACG SYSTEM

# Common health care system?

- Coding systems
- Patterns of care
- Cost structure
- Data availability
- Language

# Recent Developments

- Local Diagnostic coding systems
- Local Pharmaceutical coding systems
- Incorporation of local resource measures (costing measures)
- Adaptability to local practice behavior patterns (RAVS)
- Incorporation of available data on socio-economic measures, individual's functionality, living arrangement, and other non-morbidity based markers
- Language

# Code Sets

- Having a Country/Region specific code set allows you to input diagnosis and pharmacy files that contain any coding system. (i.e. Read, ICPC)
- Why do it?
  - Saves the end user from preprocessing their data.
  - Reduces or potentially eliminates unrecognized codes.
  - Other systems do not offering this

# Local Codes and WHO Equivalents

Country (Coding System)	Local Code	Local Description	WHO Equivalent	WHO Description
Malaysia (ICD 10-MY)	E1162	Type 2 diabetes mellitus with skin complications	E116	Non-insulin-dependent diabetes mellitus, with other specified complications
UK (READ)	C104.	Diabetic nephropathy	E142	Unspecified diabetes mellitus, with renal complications
Spain (ICPC-2)	T90	Diabetes non-insulin dependent	E11	Noninsulin-dependent diabetes mellitus

# What a Code Set Looks Like

Local Code	Code System	WHO Code	ADG
E1162	ICD10-MY	E116	11: Chronic Medical Unstable
C104.	READ-GB	E142	09: Likely to Recur, Progressive
T90	ICPC-ES	E11	10: Chronic Medical Stable

# From a Local Code → WHO Map to an Input File

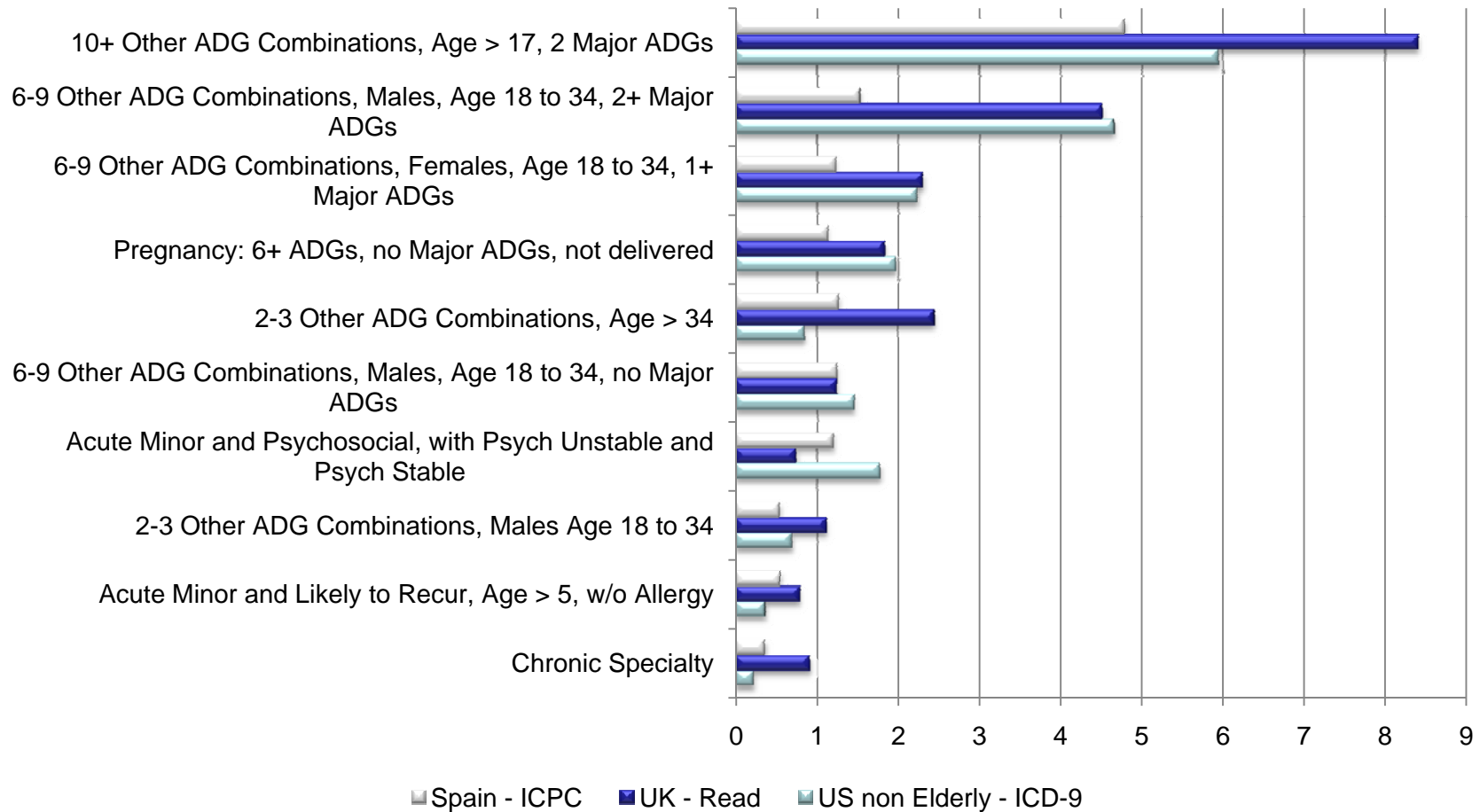
Results will depend on:

- Accurate coding practices at the point of care
- How close the local definition is to a WHO definition
- Accurate Risk Assignments

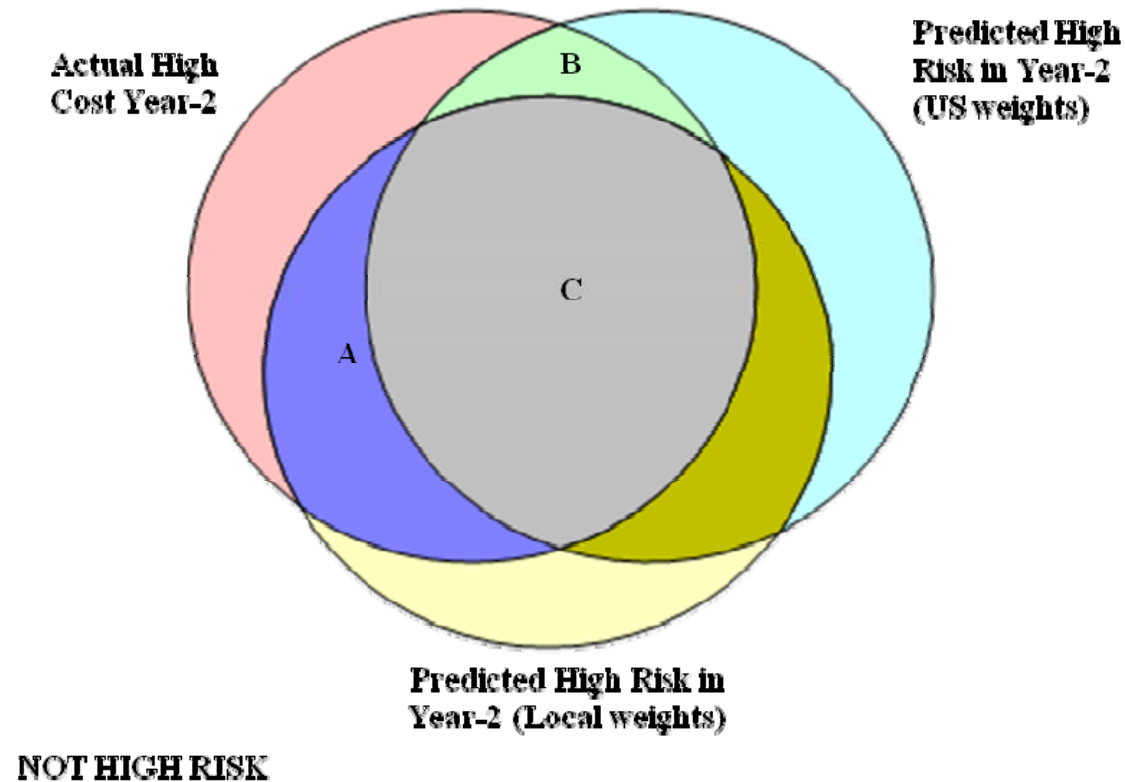
# Risk Adjustment Variables

- Concurrent Weights:
  - ACG Prevalence
- Prevalence: For each age gender category
  - EDC
  - MEDC
  - Rx-MG
  - Major Rx-MG
- Predictive Models
  - Predictive Resource Index
  - Probability Score
- RUBs

# Comparison of ACG weights

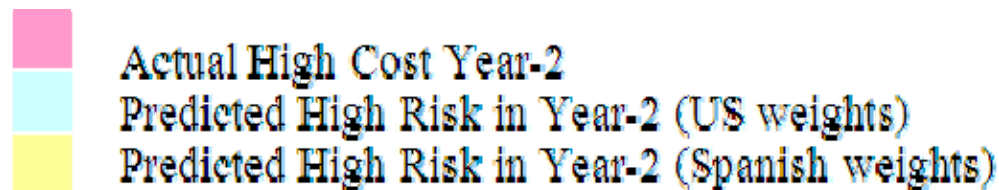
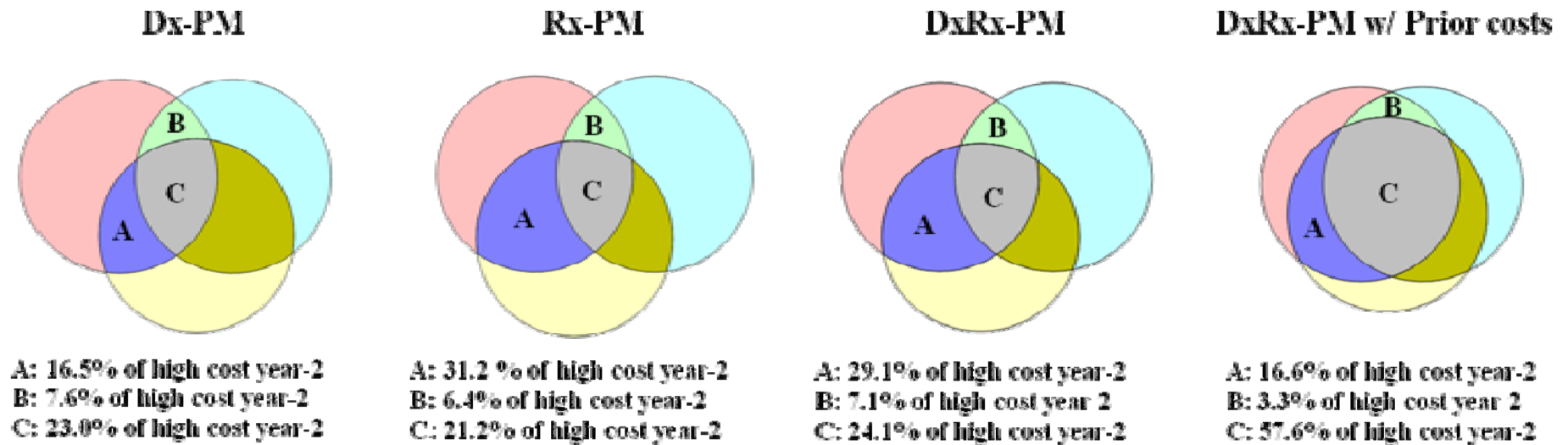


# Why would you want to create RAVs?



- A:** high cost patients identified only by Local calibration
- B:** high cost patients identified only by US weights
- C:** high cost patients identified by both US and Local weights

# Alternative Models with US vs. Spanish Weights



# Variance explained. R<sup>2</sup>

Dx-PM		Rx-PM		DxRx-PM		DxRx-PM w/ Prior costs	
US Weights	Spanish Weights	US Weights	Spanish Weights	US Weights	Spanish Weights	US Weights	Spanish Weights
18.9%	29.4%	22.2%	40.6%	23.5%	42.6%	42.6%	60.8%

# Language Localization

Types of Files	Files	Fields	Words to be translated
System (excel)	15	1,015	3,000
Labels (excel)	8	525	1,000
Tips (html)	26		1,000
Help (html)	29		8,500

Approximate Number of Words to be Translated

13,500

# Additional Sessions at this Conference

- Interactive International Forum (immediately following this plenary) with presentations from UK, South Africa, Sweden, and Israel
- Concurrent Sessions:
- Ia – experience using pharmacy data in Spain and Sweden
- Ib – looking at equity and efficiency in Israel and Malaysia
- IIb – improving care management in Sweden
- IIIb – benefits of local customization in Thailand, Spain, and Sweden
- IVb – provider profiling and choice in Sweden