

ACGs in the UK

Clinical and financial management in primary care using GP EMR data

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Objectives of Presentation



- Describe the scope of the UK pilot
- Summarise the overall findings
- Give examples of ACG-based applications at study sites

The United Kingdom

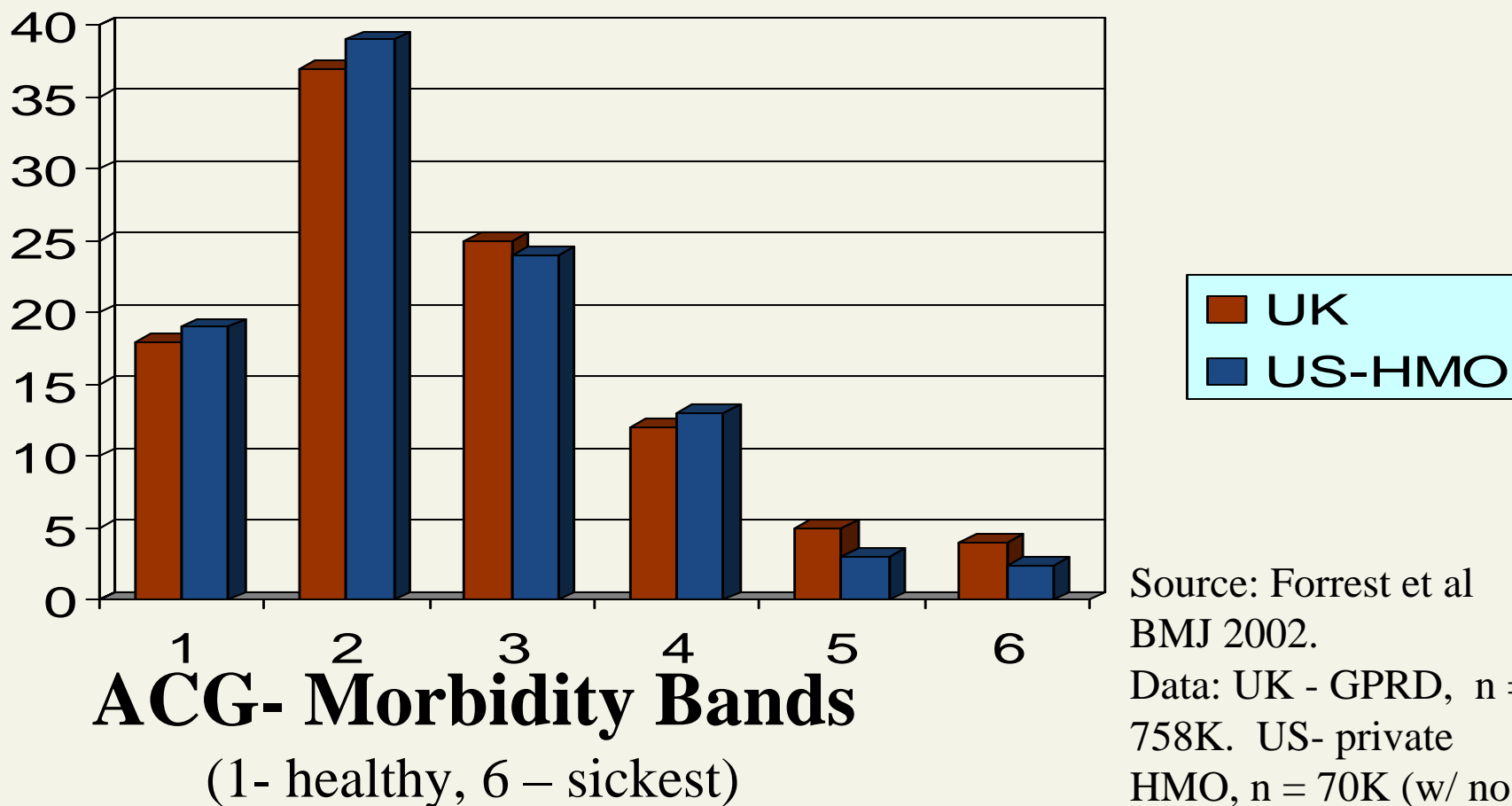


Pilot work on ACG model



- Imperial College
 - Prof Rifat Atun
 - Dr Ipek Gurol-Urganci (lead analyst)
 - Andrey Timoshkin
- Johns Hopkins
 - Prof Jonathan Weiner,
 - Dr Karen Kinder Siemens,
 - Dr Klaus Lemke,
 - Dr Hoon Byun
- Conrane
 - Dr David Cochrane,
 - Hugo Mathias

Previous Validation in UK: Distribution of ACG case-mix morbidity bands across US and UK populations (aged 0 - 65)



Source: Forrest et al
BMJ 2002.
Data: UK - GPRD, n =
758K. US- private
HMO, n = 70K (w/ no
Medicaid or uninsured)

Pilot Study

Pilot work on ACG model



3 pilot sites:

- **Leeds West: Inner city**
- **Wandsworth: Inner London**
 - **Individual practices up to 12,000**
 - **Group practices in Wandsworth**
- **Torbay**
 - **Entire locality or zone/cluster c.25,000 or 3 practices**

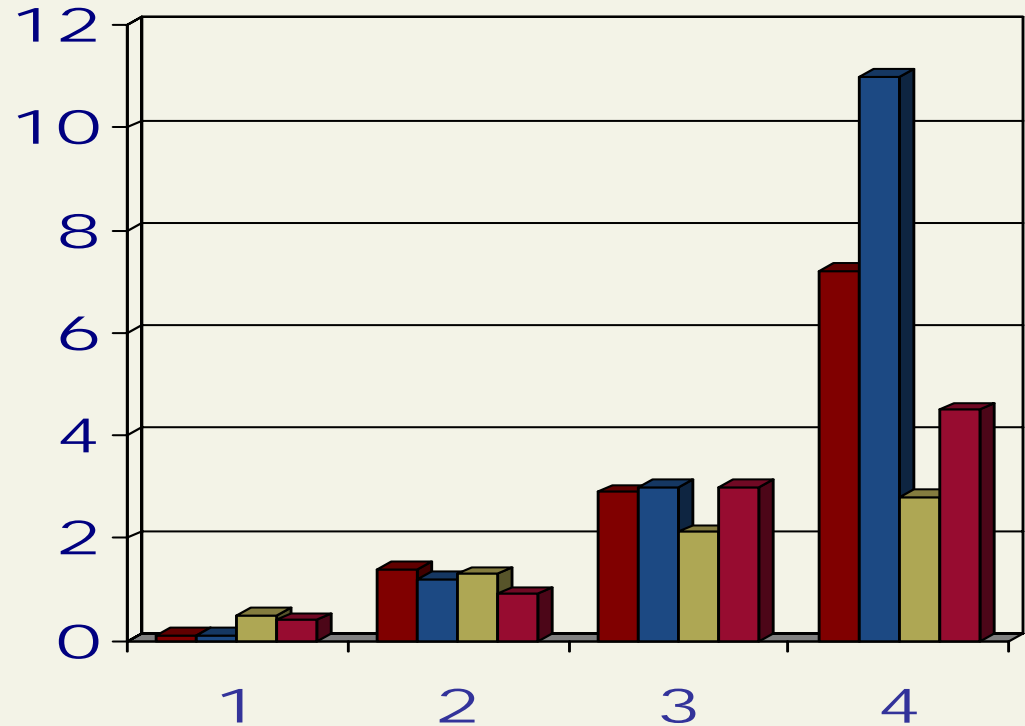
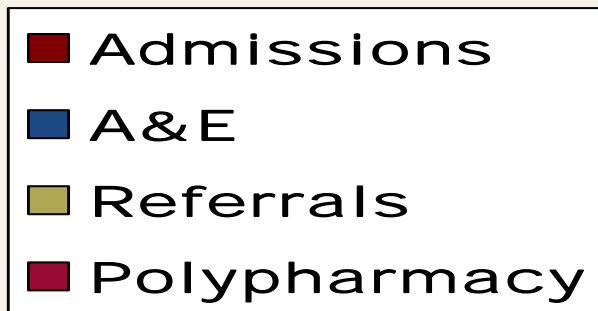
- **Population Risk Profiling**
 - to assess the disease burden and need of populations (at PCT or GP level) for equity-based **resource allocation**
- **Provider Performance Profiling**
 - to **assess efficiency** across PCTs or providers
- **Predictive modelling**
 - to **identify people at risk** for assessment and care planning in long term condition management

- Demographic variables (age/gender)
- Diagnostic data (Read codes)
 - Note:
 - ICD-10, Read 2, CTV3, *SNOMED-CT*
 - (*Pharmacy – Rx-MG, NDC, ATC, UK BNF/DMD*)

- ADGs Aggregated Diagnostic Groups (n = 32)
 - groupings of diagnosis codes similar in terms of severity and likelihood of persistence of the health condition over time
- RUBs Resource Utilisation Bands (n = 6)
 - groupings of diagnosis codes in terms of expected resource use
- EDCs Expanded Diagnosis Clusters (n ~ 200)
 - groupings of diagnosis codes to create markers representing specific diseases

Relationship Between ACG “Morbidity Bands” and Annual Resource Use

(Figures reflect relative ratios where average =1)



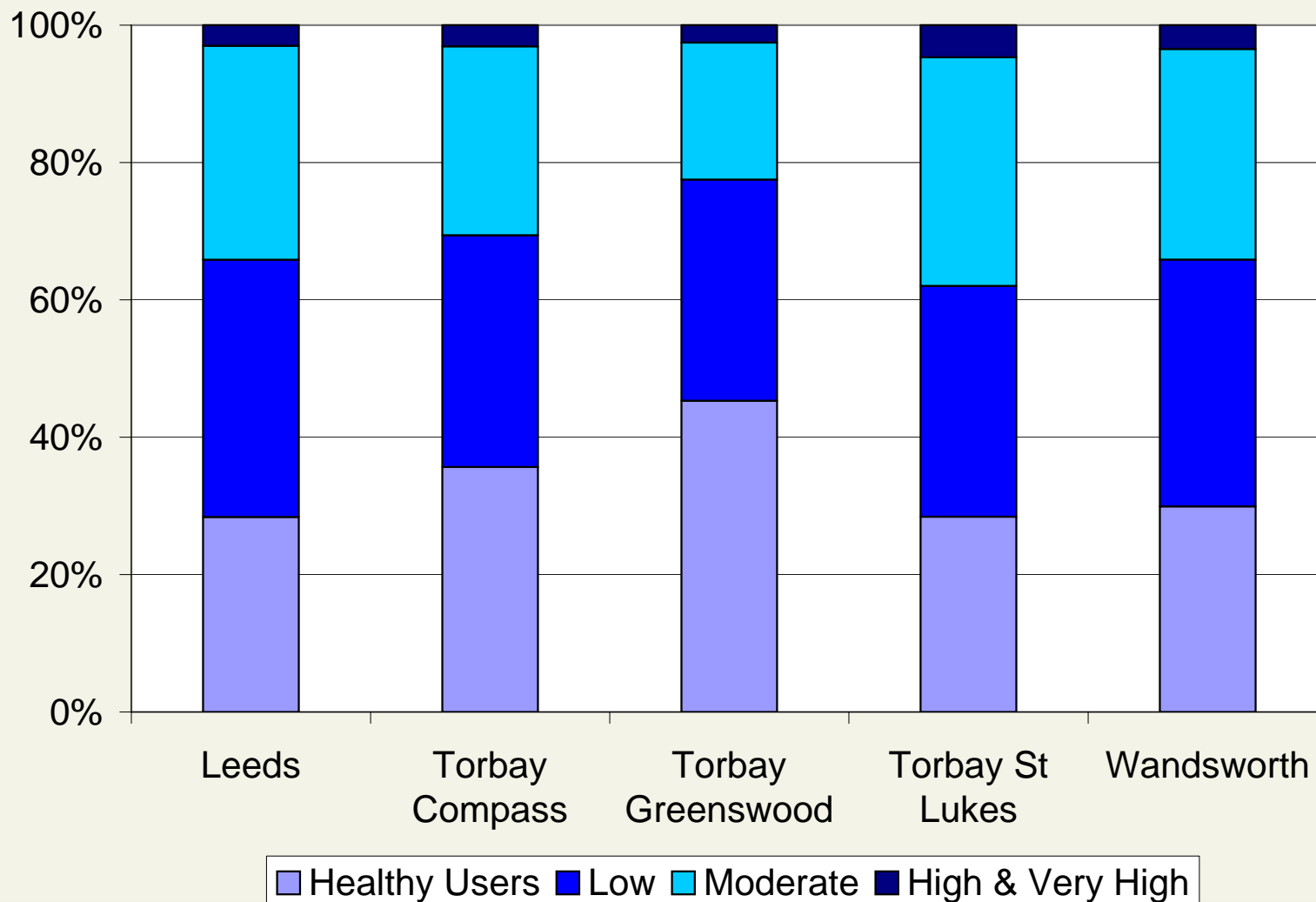
(Results from Torbay 2005)

ACG- Morbidity Bands
(1- healthy, 4-sickest)

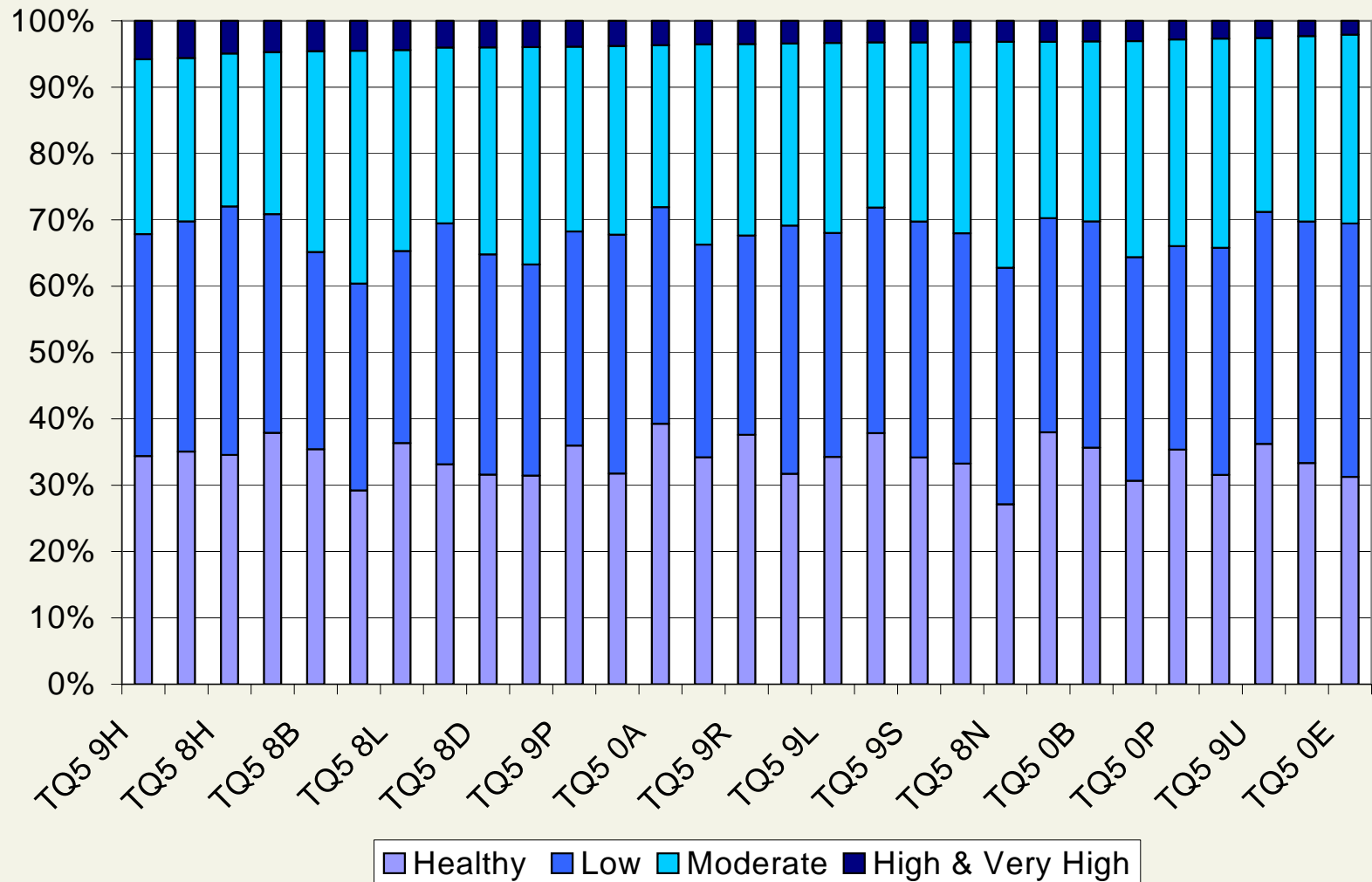
**to identify the disease burden and needs
patterns at the PCT, practice or GP level for
potential equity-based resource allocation**

- **ACG Morbidity Category (RUB: Resource Utilisation Bands)**
- **Calculated with age/gender + diagnostic info**
- **Four bands**
 - **healthy, low, moderate, high to very high**

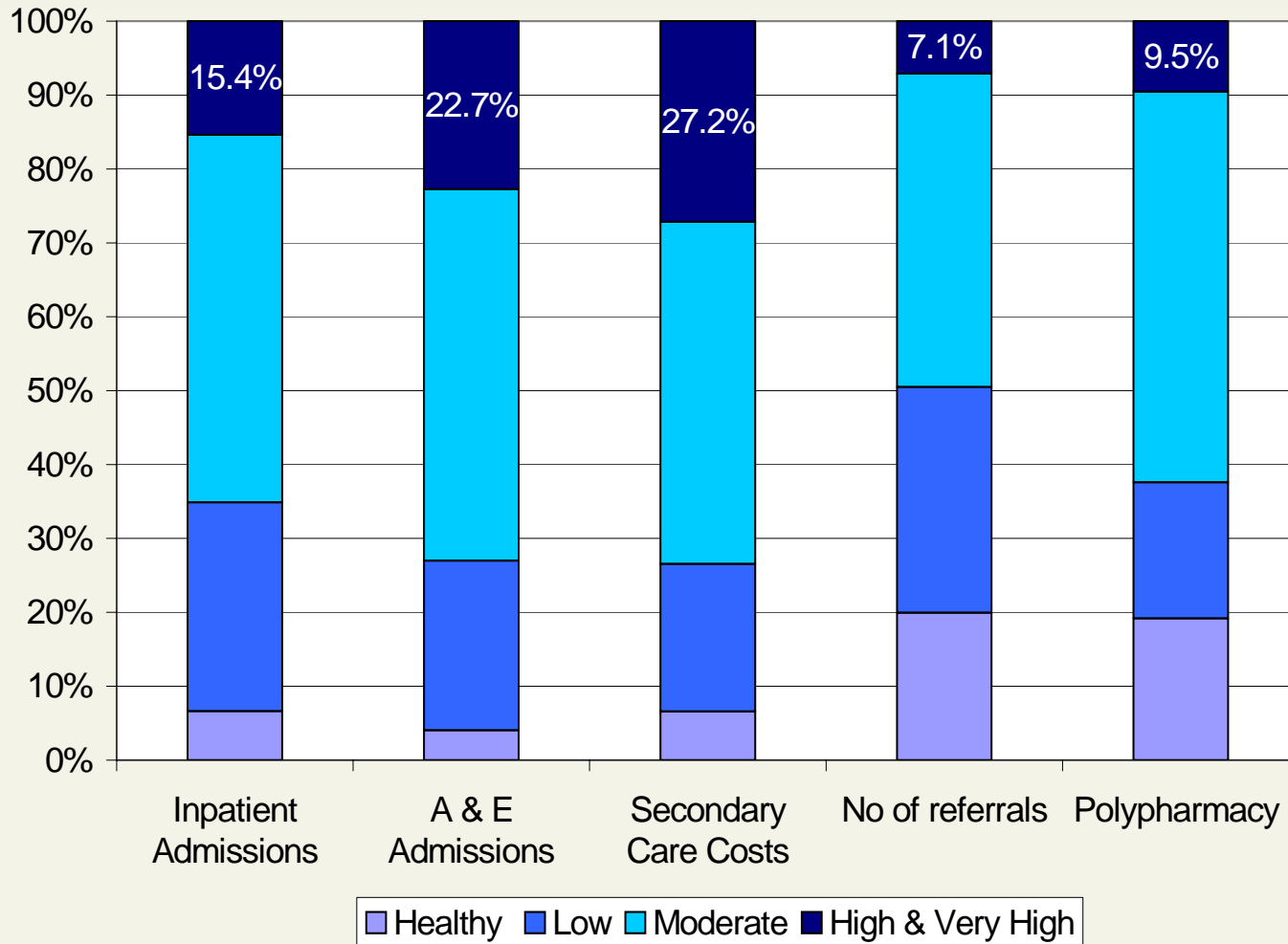
ACG-Morbidity (RUB) distribution by all pilot sites 2005



ACG-Morbidity (RUB) distribution by postcode areas, Torbay 2005



Percentage of all resources used by ACG-Morbidity (RUB) category, Torbay 2005



Distribution of Cardiovascular EDCs



		Counts			Proportions		
		Leeds	Torbay	Wandsworth	Leeds	Torbay	Wandsworth
CAR01	Cardiovascular Signs and Symptoms	22	101	26	0.35%	0.49%	0.24%
CAR03	Ischemic Heart Disease (Excluding AMI)	132	738	162	2.11%	3.59%	1.50%
CAR04	Congenital Heart Disease	3	6	4	0.05%	0.03%	0.04%
CAR05	Congestive Heart Failure	8	63	17	0.13%	0.31%	0.16%
CAR06	Cardiac Valve Disorders	2	57	14	0.03%	0.28%	0.13%
CAR07	Cardiomyopathy	0	11	7	0.00%	0.05%	0.06%
CAR08	Heart Murmur	2	9	0	0.03%	0.04%	0.00%
CAR09	Cardiac Arrhythmia	28	174	50	0.45%	0.85%	0.46%
CAR10	Generalized Atherosclerosis	276	5	0	4.41%	0.02%	0.00%
CAR11	Disorders of Lipoid Metabolism	9	87	56	0.14%	0.42%	0.52%
CAR12	Acute Myocardial Infarction	5	30	2	0.08%	0.15%	0.02%
CAR13	Cardiac Arrest, Shock	0	3	0	0.00%	0.01%	0.00%
CAR14	Hypertension, w/o Major Complications	863	148	670	13.79%	0.72%	6.19%
CAR15	Hypertension, w/ Major Complications	0	11	0	0.00%	0.05%	0.00%
CAR16	Cardiovascular Disorders, Other	5	80	8	0.08%	0.39%	0.07%

- To assess performance efficiency at the PCT / Practice or GP level
- By adjusting for risk, you counter the argument that “my patients are sicker”.

Comparing Actual Primary Care Sector Resource Use To Morbidity Based Expectations (Torbay)



	Unadjusted Relative Use (obs./avg.)	ACG – Morbidity Based Resource Score (expected/average)
	No of referrals	
Practice A	0.982	0.824
Practice B	1.272	0.988
Practice C	0.875	1.330
	No of unique prescriptions / month	
Practice A	1.005	0.838
Practice B	0.671	0.965
Practice C	1.247	1.279
	No of unique lab tests	
Practice A	0.936	0.841
Practice B	0.893	0.995
Practice C	1.189	1.312

Comparing Actual Secondary Care Sector Resource Use To Morbidity Based Expectations (Torbay)



	Unadjusted Relative Use (obs./avg.)	ACG – Morbidity Based Resource Score (expected/avg.)
	Secondary Care Costs	
Practice A	0.960	0.748
Practice B	0.790	0.818
Practice C	1.177	1.571
	Inpatient Admissions	
Practice A	0.981	0.740
Practice B	0.917	0.860
Practice C	1.027	1.462
	Outpatient Admissions	
Practice A	0.952	0.903
Practice B	1.316	1.034
Practice C	0.960	1.105

Performance Profiles Across Torbay (Primary Care Measures):



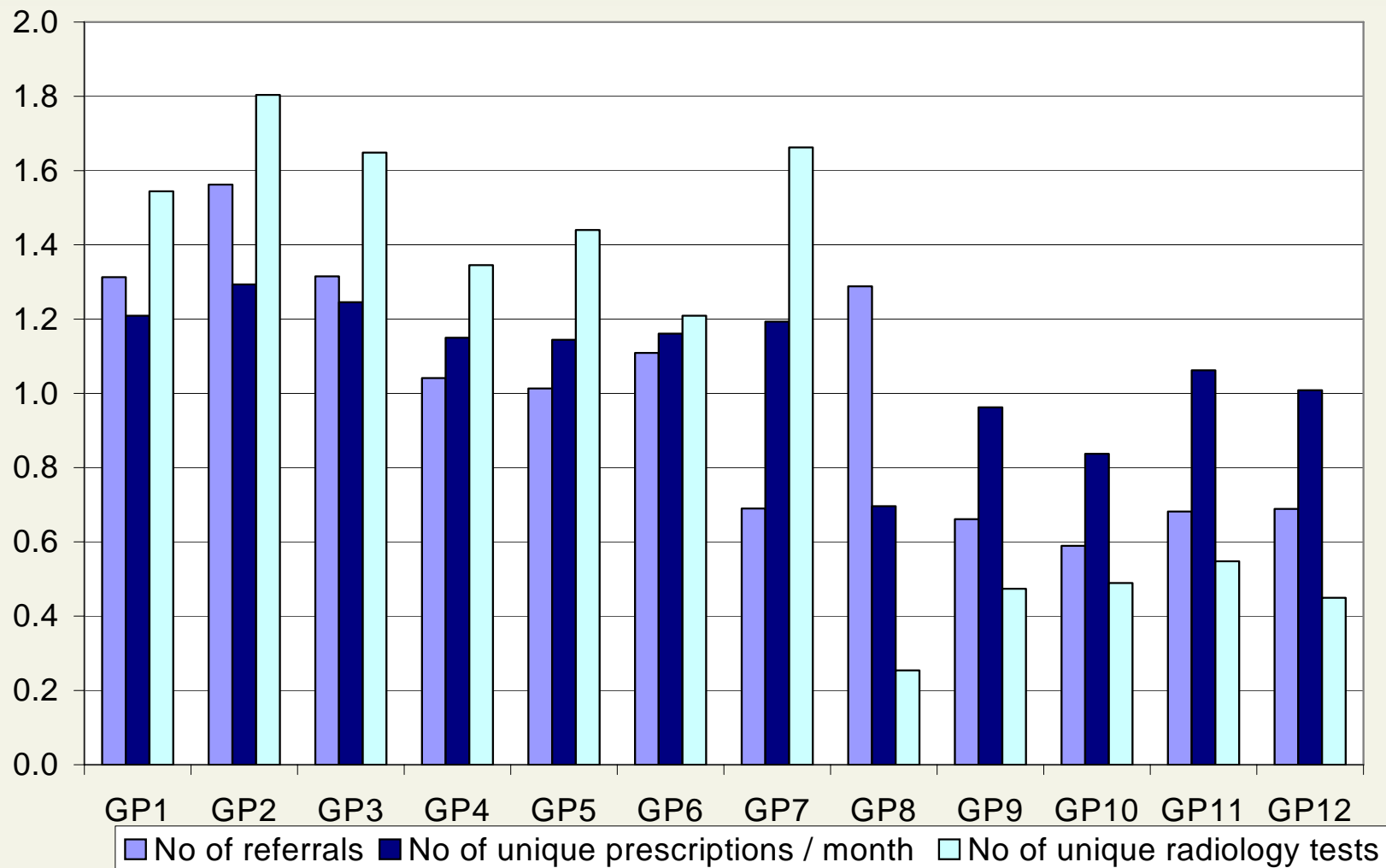
	Unadjusted Relative Use (obs/avg)	ACG – Morbidity Based Resource Score (exp/avg)	Efficiency (obs/exp)
	No of referrals		
Practice A	0.982	0.824	1.192
Practice B	1.272	0.988	1.287
Practice C	0.875	1.330	0.658
	No of unique prescriptions / month		
Practice A	1.005	0.838	1.199
Practice B	0.671	0.965	0.695
Practice C	1.247	1.279	0.975
	No of unique lab tests		
Practice A	0.936	0.841	1.113
Practice B	0.893	0.995	0.897
Practice C	1.189	1.312	0.906

* Ratio of Actual to overall average cost, and indicates whether the site is using more (>1) or less services than the overall average.

** Describes the morbidity level of the given population as measured by the ACG system where values greater than 1.0 implies higher illness burden than expected.

***Relative Cost after having adjusted for underlying case-mix of the population. Values below 1.0 imply the site is more efficient than the 'average' provider treating a population at that case-mix.

Risk-Adjusted O/E (Efficiency) Ratios by GPs Across Torbay



- To identify persons for inclusion in case and care management
- Predictive of any primary and/or secondary care variable of interest, such as
 - Inpatient admissions
 - Outpatient visits
 - Number of referrals
 - Number of prescriptions
- Can also be used to assess length of stay, diagnostics (radiology, path tests and ECGs), referrals, and prescription costs (if available)

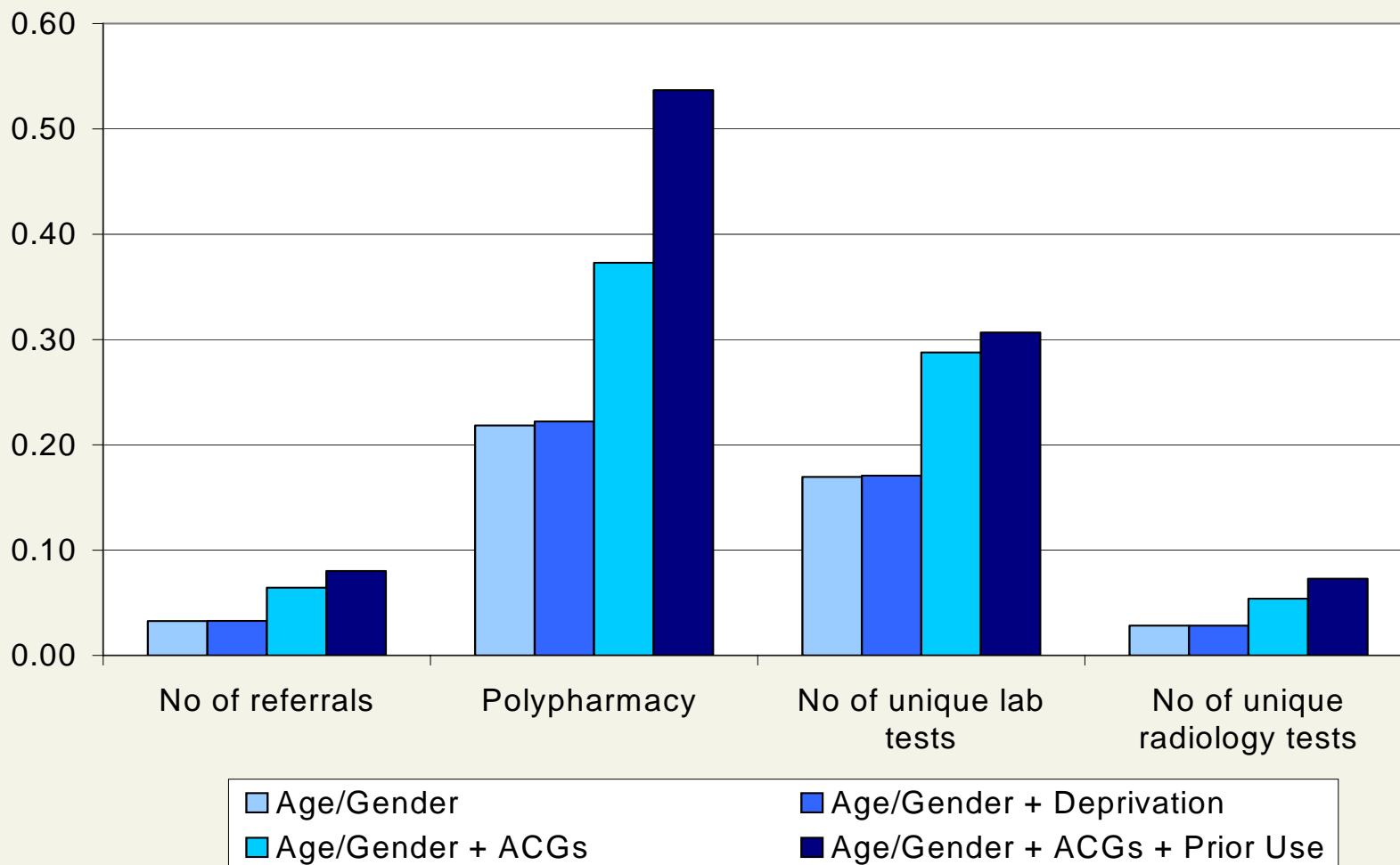
Model Definitions



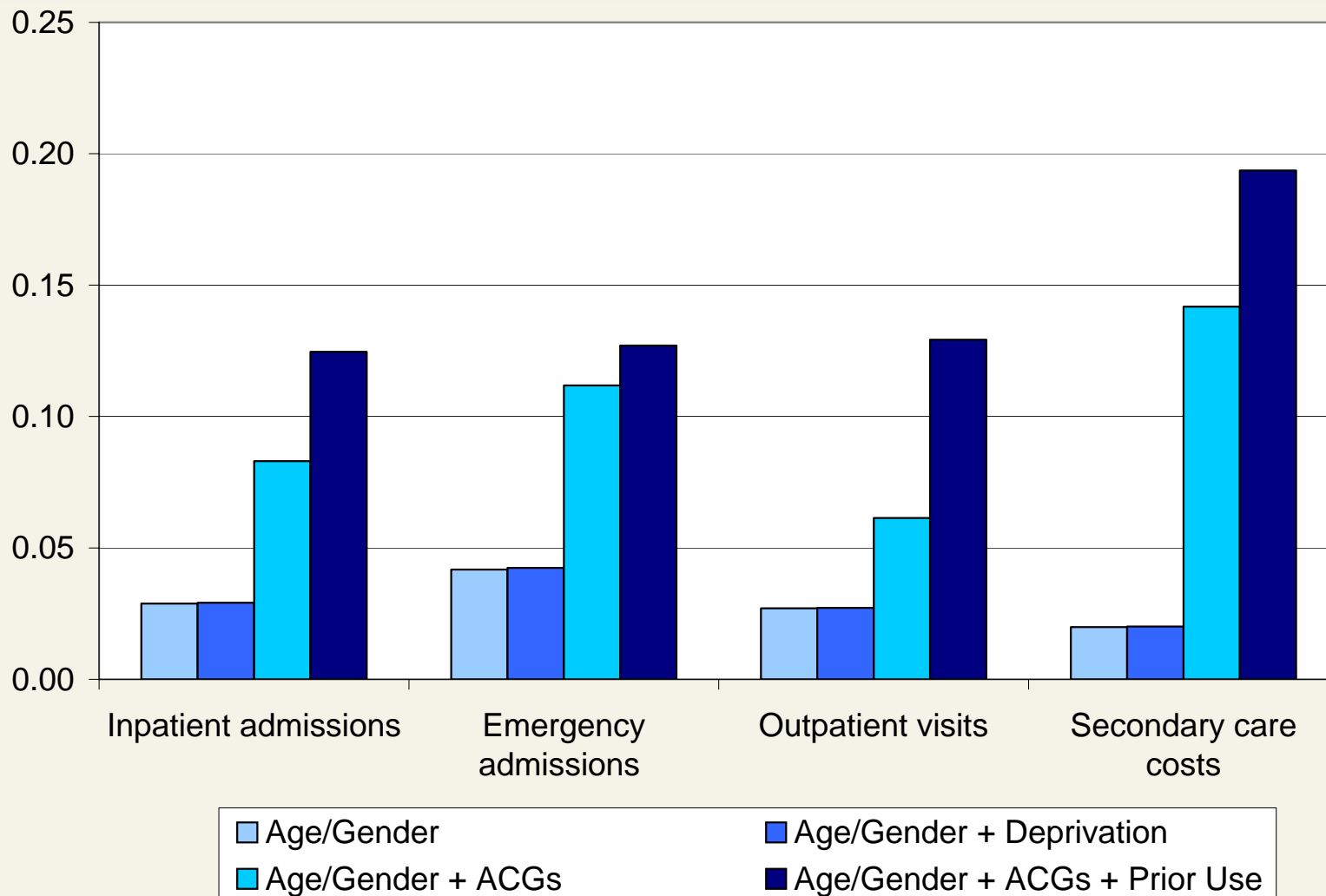
JOHNS HOPKINS

	M1	M2	M3
	DEM	DEM + ACG	DEM + ACG + Prior Use
11 age variables	Y	Y	Y
1 gender variable	Y	Y	Y
3 prior drug use measures			Y
3 prior hospital use measures			Y
12 prior emergency use measures			Y
6 specialty prior use measures			Y
2 key condition markers		Y	Y
Hospital Dominant condition marker		Y	Y
Frailty marker		Y	Y
ADGs (34 variables)		Y	Y
EDC (98 variables)		Y	Y
All ACG variables are diagnosis based			

Explanatory Power of Alternative Models, Primary Care Utilisation Data, Torbay



Explanatory Power of Alternative Models, Secondary Care Utilisation Data, Torbay



- **Predictive modelling to estimate the likelihood of high risk, as defined by utilisation variables such as:**
 - **Inpatient admissions**
 - **Outpatient admissions**
 - **No of referrals, visits**
 - **No of Rx, lab and radiology tests**

Secondary Care: Inpatient Admissions		
	<u>Sensitivity</u>	<u>Positive Predictive Value</u>
Top 1%	4.2%	47.9%
Top 5%	16.0%	36.5%
Top 10%	28.5%	32.4%
Primary Care: Pharmacy Use (5+ unique drugs per month)		
Top 1%	9.4%	94.8%
Top 5%	38.2%	77.1%
Top 10%	61.9%	62.2%

- Sensitivity: Percentage of identified cases among all true cases
- Positive Predicted Value: Percentage of cases correctly identified as high risk

Opportunities



- **Potential for equitable resource allocation on clinical as well as demographic criteria**
- **Potential for external performance monitoring of practices**
- **Potential for internal practice management**
 - **Resource utilisation**
 - **Individual physician profiling**
- **Wider applications**
 - **Demand management**
 - **Identification and management of high cost, LTC patients**

- **ACGs provide a conceptually simple, statistically valid, transparent and clinically relevant measure useful for assessing the need for health services.**
- **Uses readily available input data**
- **One tool with multiple applications**
 - **Planning**
 - **Allocating Resources**
 - **Performance management (internal and external)**
 - **Predictive modeling**

- Diagnosis based (ICD-9 and ICD-10) has been converted to Read / CTV3 system with high level of completeness.
- Has been tested with GPRD (1.2 M) and UK morbidity survey and GP electronic medical records with and data from 5 PCTs (over 600K patients)
- Has been tested with secondary data (Over 2 million HES)
- We have completed conversion of Rx-MGs (pharmacy risk measures) to WHO ATCs and Read/CTV-3

- **ACG Web Site:**

- www.acg.jhsph.edu

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