Geographic Variation in Potentially Avoidable Hospitalizations in the Languedoc-Roussillon region, France

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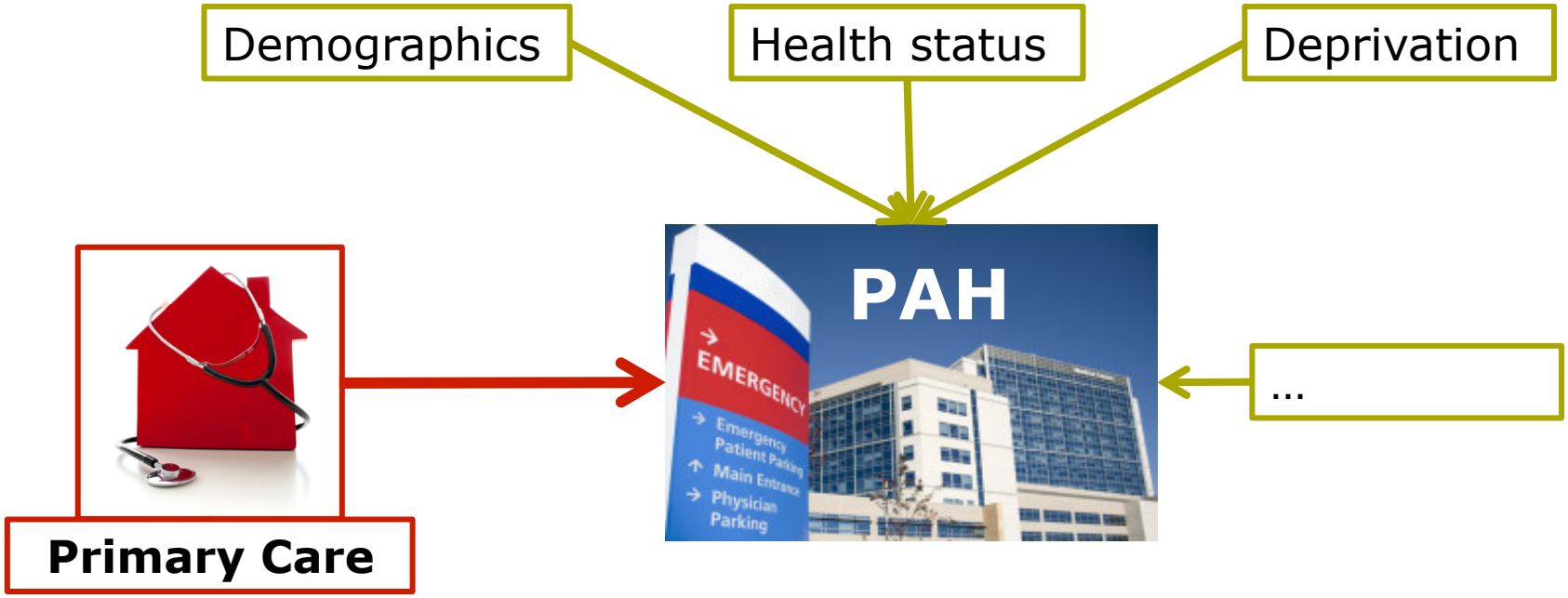
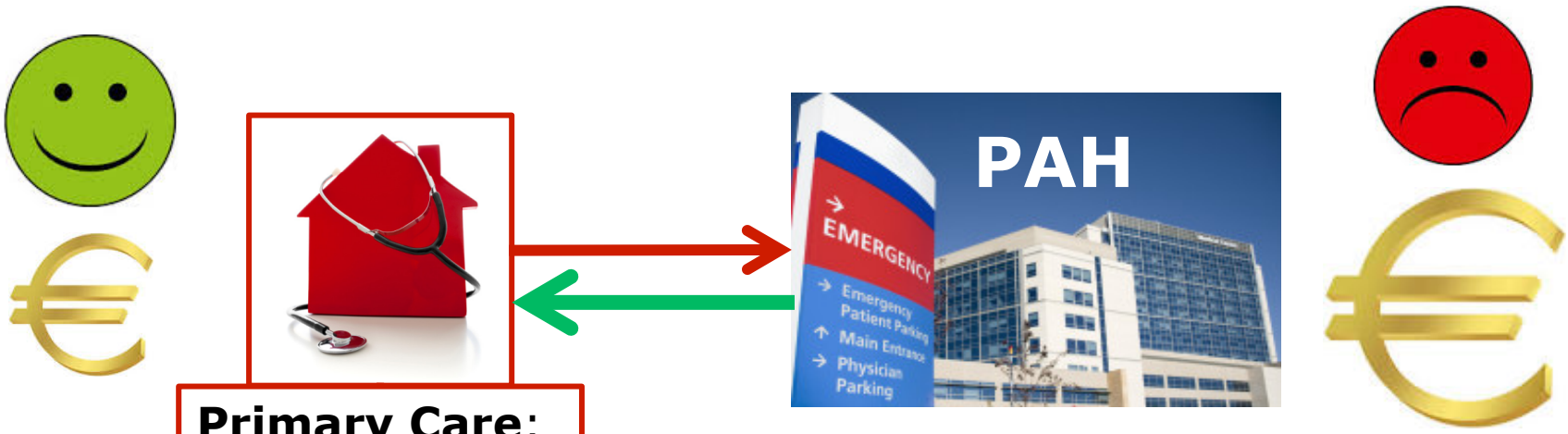
Potentially avoidable hospitalizations (PAH) are partly explained by primary care



Weissman 1992, Cheng 2010, Nyweide 2013, Rosano 2013

Understanding the drivers of PAH might help to design and monitor policy interventions



Primary Care:
-Supply
-Access
-Continuity
-Quality
-…

Analyzing geographic variation in PAH rate is an interesting approach:

- « The good, the bad and the inexplicable »
- Some factors are not defined at the individual level (e.g. GPs density).
- Some factors are not available at the individual level (e.g. income).

Busby 2015, Rosano 2013, The King's Fund 2011

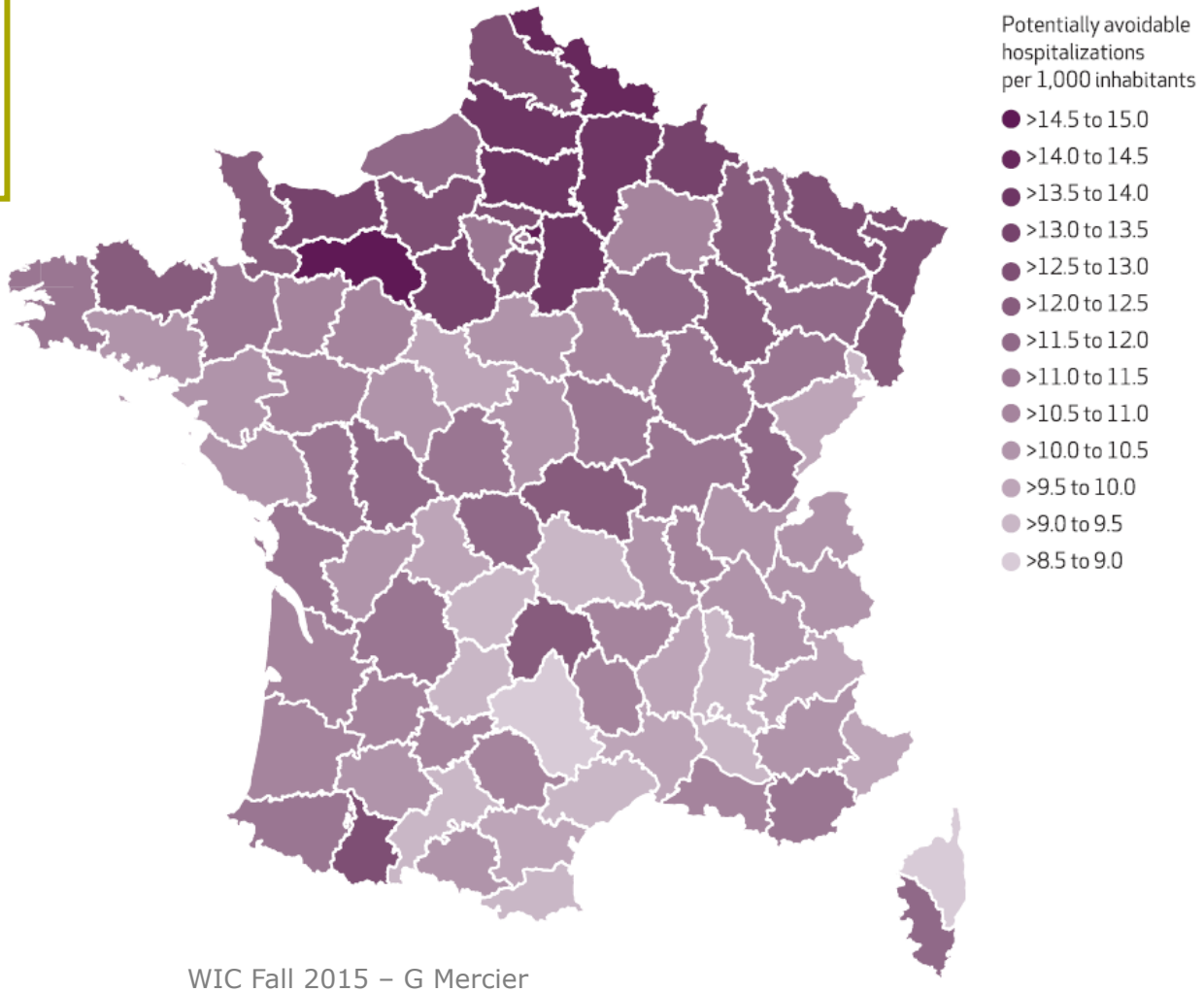
Study # 1: Geographic variations in PAH in France

G. Mercier et al., Health Affairs 34, no.5 (2015):836-843

- **Data:**
  - National hospital discharge database (PMSI), France, 2012
  - PAH definition: Weissman et al, adapted by Gusmano et al to ICD-10
  - Determinants: demographics, mortality, deprivation, primary & secondary care supply
- **Model:**
  - Age and sex-standardized PAH rates calculated at the ZIP-code level (n=5,590)
  - Multilevel mixed model with 2 levels: ZIP code and *département (*n=96)
- **Primary care factors:**
  - **Density** of general practitioners, specialist physicians and ambulatory care nurses per 1,000 inhabitants **at the *département* level**

Results show a huge variation in PAH…

739, 339 PAH
11.4 PAH/1000/year
Range: 8.5 – 15



…And suggest a protective role of the density of ambulatory care nurses.

	Driver	Estimate	SE	p
ZIP code level	Baseline (intercept)	11.3	0.11	< 0,001
ZIP code level	**Annual median patient income (per 10,000 €)**	-0.58	0.27	0.01
ZIP code level	**Education level beyond high school (proportion)**	-8.3	0.95	< 0.001
Dpt level	**Acute care hospital beds per 1,000 inhabitants**	-0.5	0.15	0.001
Dpt level	General practitioners per 1,000 inhabitants	-0.04	0.75	NS
Dpt level	Specialists per 1,000 inhabitants	0.57	0.75	NS
Dpt level	**Ambulatory care nurses per 1,000 inhabitants**	**-1.03**	**0.28**	**< 0.001**
Dpt level	**Standard mortality ratio**	7.39	1.28	0.001

This first study had 4 main limitations:

- **PAH definition**: incomplete (e.g. COPD); acute and chronic conditions
- **Primary care data**: density, not actual utilization; department level
- **Model**: assumption of independence of the geographic areas
- « **So what?** »: How to translate these results into effective policy?

Our next project is designed to overcome these limitations.

- **PAH definition** → AHRQ PQI (Thygesen 2015)
- **Primary care data** → actual utilization at the ZIP-code level
- **Model** → spatial regression
- « **So what?** » → Regional Health Authority onboard

Overview of the second project

- **Objective:** To analyze the geographic variation in PAH in the Languedoc-Roussillon region.
- **Data:**
  - **Languedoc-Roussillon** region (~3 M inhabitants)
  - Regional **hospital** discharge database (PMSI), 2014
  - + regional **outpatient care** database, 2014
  - PAH definition: **AHRQ**, chronic conditions only
  - Determinants: demographics, mortality, deprivation, access to secondary care, **primary care utilization & organization**
  - All are available at the **ZIP code level**

Overview of the second project

- **Primary care factors:**
  - Standardized **utilization rates** of GP visits, ambulatory specialists visits and nursing care.
  - **Ambulatory nurses networks** (SSIAD)
  - Primary care **multidisciplinary practices** (MSP)
- **Model:**
  - Age and sex-standardized PAH rates calculated **at the ZIP-code level** (n=273)
  - Mixed model with explicit **spatial component**
  - Spatial correlation matrix based on contiguity

Expected results and impact

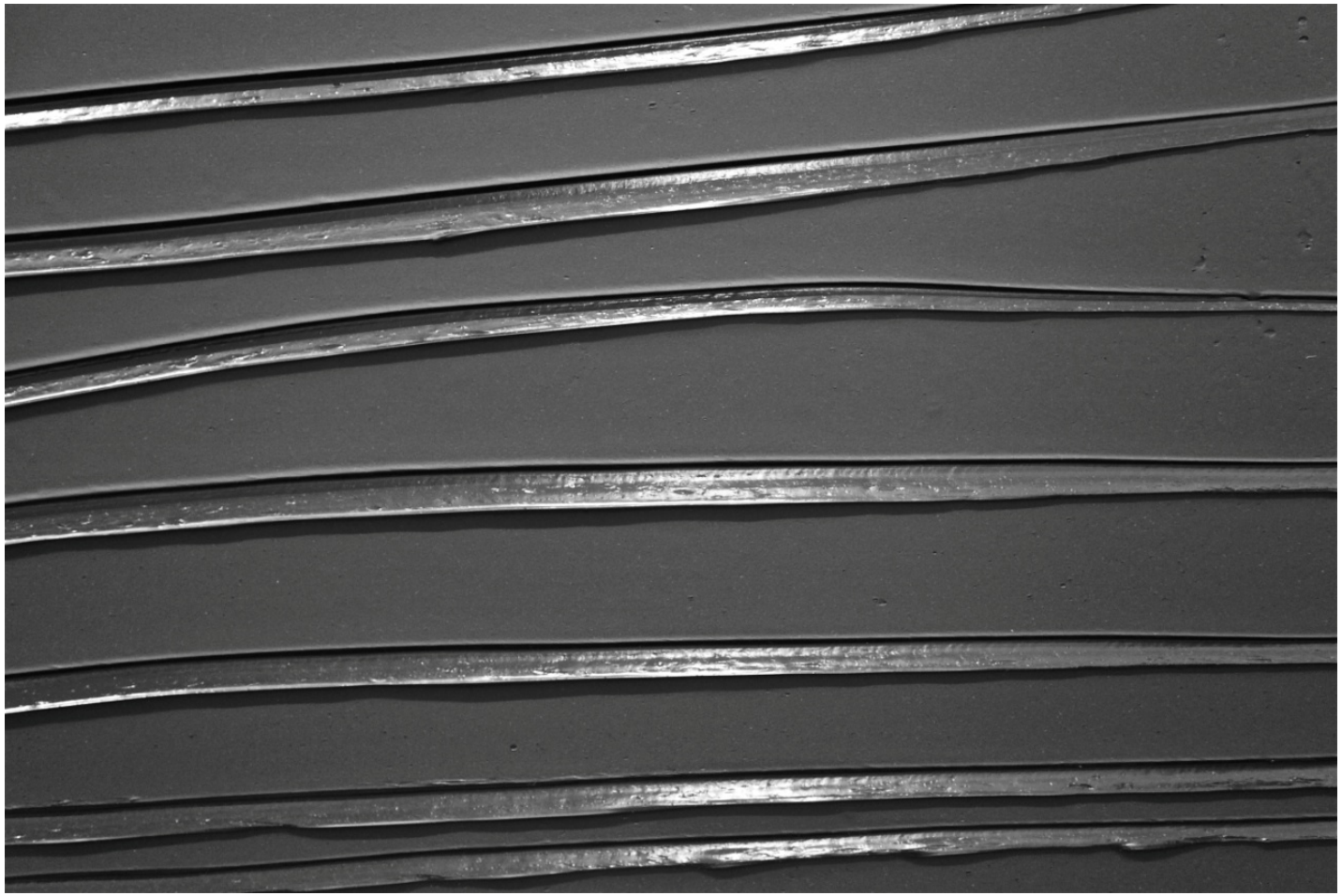
- Assessment of the geographic variation in PAH
- Better understanding of the role of primary care (utilization and organization) in this variation
- Contribution to the definition of policy interventions (density of primary care, training, coordination)
- Regional observatory of PAH to monitor time trends

Research consortium and Financing

- **Research consortium:**
  - Montpellier Teaching Hospital
  - Regional Health Authority
  - LAMETA, Montpellier University

- **Financing:**
  - Application to a research projects call (PREPS, MoH)
  - Step 1 successfull
  - Fingers crossed!

On the power of variations (Pierre Soulages)



Thank you for your attention!

Aknowledgments:

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Potentially avoidable hospitalizations Weissman 1992 & Gusmano 2006

N°	Category	ICD-10 codes (principal diagnosis only)
1	Bacterial pneumonia	J13, J14, J15, J16.0, J16.8, J18
2	Congestive heart failure	I50
3	Asthma	J45
4	Cellulitis	J34.0, K12.2, L02, L03
5	Complications of peptic ulcer disease	K25.0, K25.1, K25.2, K25.4, K25.5, K25.6, K26.0, K26.1, K26.2, K26.4, K26.5, K26.6, K27.0, K27.1, K27.2, K27.4, K27.5, K27.6, K28.0, K28.1, K28.2, K28.4, K28.5, K28.6
6	Pyelonephritis	N10, N11, N12, N13.6, N15.8, N15.9, N17.2
7	Type 2 diabetes mellitus with hyperosmolarity or coma	E10.0, E10.1, E11.0, E11.1, E13.0, E13.1, E14.0, E14.1
8	Ruptured appendix	K35.2, K35.3
9	Hypertension	I10, I11.0, I11.9, I12.0, I12.9, I13.0, I13.1, I13.2, I13.9, I15.0, I15.1, I15.2, I15.8, I15.9, I67.4
10	Hypokalemia	E87.6
11	Immunizable conditions	A35, A36, A37, A80, B05, B26
12	Gangrene	I73.0, L88, I70.2

ICD-10 : International Classification of Diseases, 10th revision

Frequency of PAH clinical categories in France, 2012

Clinical categories of potentially avoidable hospitalizations	Number	Percent (%)
Congestive heart failure	209,558	28.34
Bacterial pneumonia	177,093	13.95
Pyelonephritis	78,314	10.59
Cellulitis	70,734	9.57
Asthma	50,588	6.84
Gangrene	43,654	5.90
Hypertension	36,087	4.88
Ruptured appendix	28,508	3.86
Complications of peptic ulcer disease	22,398	3.03
Type 2 diabetes mellitus with hyperosmolarity or coma	15,033	2.03
Hypokalemia	5,716	0.77
Immunizable conditions	1,656	0.22
Total	**739,339**	**100 %**

Sample characteristics: PAH and their determinants in France, 2012

Indicator	N	Mean	SD	Min	Median	Max
Age- and sex-adjusted potentially avoidable hospitalization rates per 1,000 inhabitants	5,590	**11.4**	3.1	0.1	11.1	44.4
Annual median patient income (€)	5,590	18,490	3,733	5,480	17,865	44,855
Education level beyond high school (%)	5,590	36.9	9.5	15.7	35.4	82.8
Acute care hospital beds per 1,000 inhabitants	96	2.5	0.8	1.3	2.2	4.8
General practitioners per 1,000 inhabitants	96	0.9	0.2	0.7	0.9	2.1
Specialists per 1,000 inhabitants	96	0.2	0.2	0.1	0.2	1.9
Ambulatory care nurses per 1,000 inhabitants	96	1.3	0.6	0,4	1.1	3.6
Crude death rate per 1,000 inhabitants	96	9.8	2.0	5.5	9.8	15.8
Standard mortality ratio	96	1.1	0.1	0.9	1.1	1.4
CMU-C recipients	96	5.6	1.8	2,6	5.3	11.7

ZIP code level in red / *département* level in blue