

SERVIZIO SANITARIO REGIONALE  
EMILIA-ROMAGNA



Agenzia  
sanitaria  
e sociale  
regionale



Regione Emilia-Romagna

# A Regional Model to Predict Identify and Manage Multimorbidity and Frailty

Regione Emilia-Romagna

# Identifying (and taking charge of) patients at high risk of hospitalization and frailty

§ Regional predictive model to classify patients by 'risk profile' (risk of hospitalization for problems that are potentially avoidable, or whose progression may have been avoided or delayed)

§ Provision of information on high-risk patients to the general practitioners (GPs) and nurses in the Case della Salute (Community Health Centers-CHC).

**BMJ Open** Predicting risk of hospitalisation or death: a retrospective population-based analysis

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**ABSTRACT** Develop a predictive model using an administrative healthcare database that provides information for General Practitioners to proactively identify patients at risk of hospitalisation for conditions that may be managed through improved patient care.

**Design:** Retrospective healthcare utilisation analysis with multivariable logistic regression models.

**Setting:** A population-based longitudinal database of residents served by the Emilia Romagna, Italy, health service in the years 2004-2012 including demographic information and utilisation of health services by 2,726,380 people aged ≥16 years.

**Outcome measures:** Models designed to predict risk of hospitalisation in 2012 for 100,000 of an initially available were developed and evaluated using the area under the receiver operating curve (AUC) in terms of their sensitivity, specificity and positive predictive value, and for calibration to assess performance across levels of predicted risk.

**Results:** Among the 2,726,380 adult residents of Emilia Romagna at the end of 2011, 646,100 (23.3%) were hospitalised in 2012. A 2% were hospitalised for the cardiac condition of death in 2012 (0.2% hospitalised, 1.2% died). The C-statistic for predicting 2012 outcomes was 0.85. The model was well calibrated across categories of predicted risk. For those patients in the highest predicted risk decile group, the average predicted risk was 33.3% and the actual proportion of hospitalisation or death was 36.2%.

**Conclusions:** We have developed a population-based model using an administrative healthcare database that identifies the risk of hospitalisation for residents of the Emilia Romagna region with a level of performance as high as or higher than similar models. The results of this study, along with profiles of patients identified as high-risk are being provided to the physicians and other healthcare professionals associated with the Patient General Medical Teams in aid of planning for case management and resources to the new region's patient's database of a predictable, high-cost population.

**Strengths and limitations of this study**

- The study included the entire adult population of the Emilia Romagna Region of Italy, over 2.7 million people.
- The study used an existing longitudinal administrative healthcare database with both the advantage of much lower cost than new data collection and the disadvantage of potential biases in administrative data.
- The results of the study are being used to assist in the development of newly formed Patient General Medical Teams.

**Primary care has a central role in the Italian National Health Service (NHS). Therefore regional governments are responsible for ensuring the delivery of a health service package through a network of geographically defined, population-based Local Health Authorities. Primary care physicians work for these authorities as independent contractors and act as gatekeepers for specialty and other referral services for their patients. With the belief that a strong primary care system is essential to innovative secondary**

 CrossMark

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- ü adult population
- ü use of regional health/administrative data
- ü calculate the Risk Score
- ü high level of statistic accuracy (C= 0.85)
- ü Louis DZ et al, BMJ Open 2014



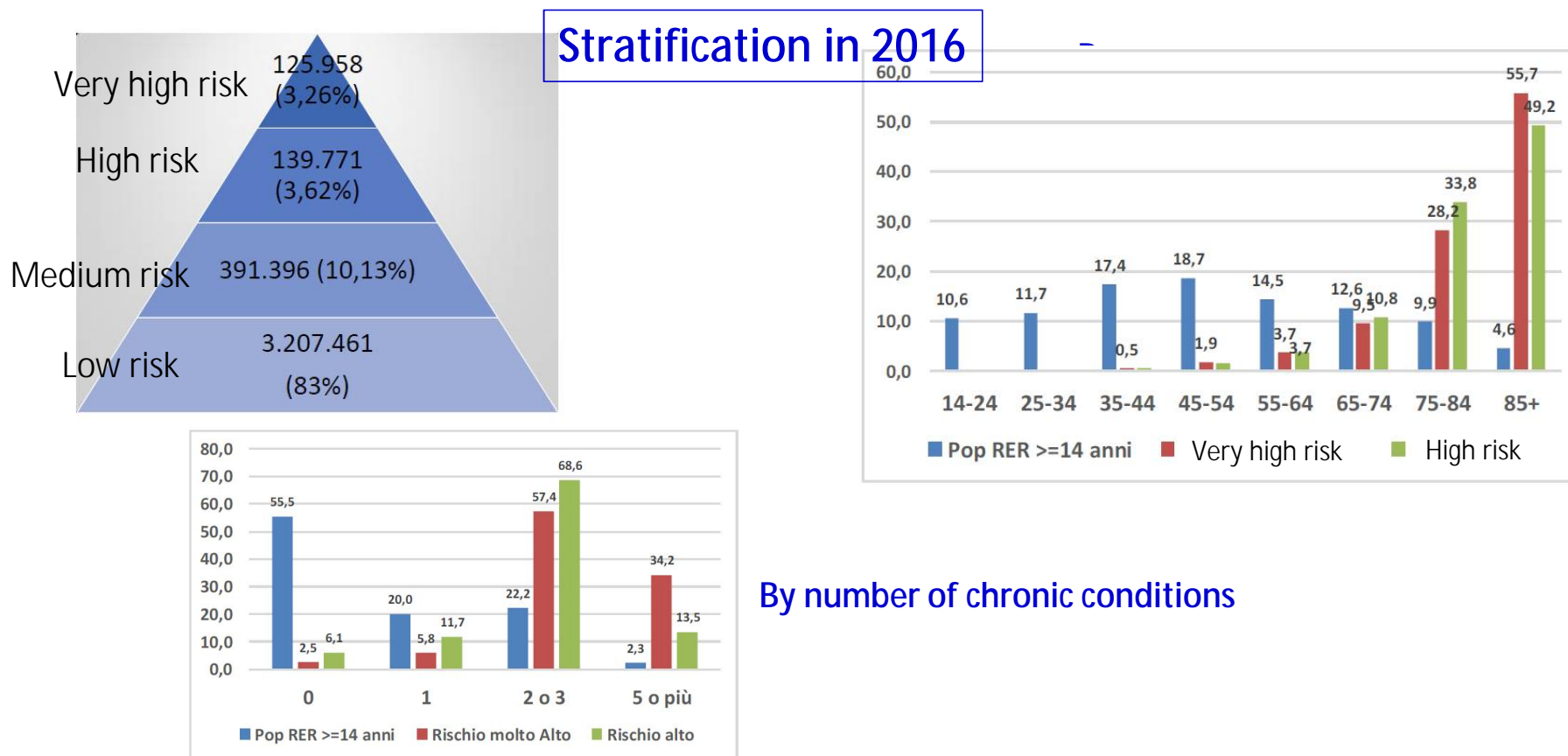
## Information Collected

- Chronic Diseases/Multimorbidity
- Pharmaceuticals
- Specialist visits
- Hospitalization
- Emergency care
- Adherence to Guidelines

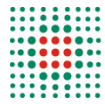


**RISK  
SCORE**

## Identifying (and taking charge of) patients at high risk of hospitalization and frailty



By number of chronic conditions



## Taking charge of patients at high risk of hospitalization and frailty

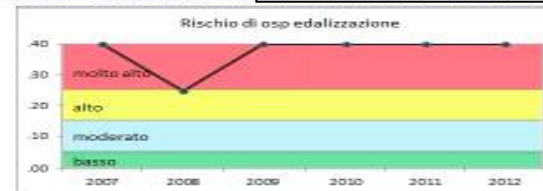
Paziente: 1094553 Patient  
Sesso: F Età: 44

### Risk profile

Rischio di ospedalizzazione previsto per il 2013:

Molto alto

Il grafico mostra il cambiamento nel tempo del rischio di ospedalizzazione previsto per il paziente



Questo documento è un sommario delle informazioni di natura amministrativa per un paziente previsto a probabile 'rischio molto alto' di ospedalizzazione nel 2013 in base ai consumi sanitari del 2012.

#### Patologie croniche (in base al sistema o eziologia)

- |   |  |  |
|---|--|--|
| <input checked="" type="checkbox"/> Cardiovascolari   | <input type="checkbox"/> Genitourinarie          | <input type="checkbox"/> Oftalmologiche            |
| <input type="checkbox"/> Dermatologiche               | <input type="checkbox"/> Ginecologiche           | <input type="checkbox"/> Otorinolaringoiatriche    |
| <input type="checkbox"/> Ematologiche                 | <input type="checkbox"/> Immunologiche           | <input checked="" type="checkbox"/> Psichiatriche  |
| <input type="checkbox"/> Endocrine                    | <input type="checkbox"/> Infettive               | <input type="checkbox"/> Respiratorie              |
| <input checked="" type="checkbox"/> Epatiche          | <input type="checkbox"/> Muscoloscheletriche     | <input type="checkbox"/> Sistema Genitale Maschile |
| <input checked="" type="checkbox"/> Gastrointestinali | <input checked="" type="checkbox"/> Neurologiche | <input type="checkbox"/> Tumoriali                 |

Chronic conditions

#### Ospedalizzazione 2012 - N. di ricoveri occorsi al paziente: 1

##### N. 1 Degenza ordinaria presso Ospedali Riuniti-Pr

02/01/12 - 02/02/12 gg\_deg: 31 Dimissione: Ordinaria a domicilio  
 Patologia principale del ricovero: 785.59 Altro Shock Senza Menzione Di Trauma  
 Comorbidità: 789.5 Ascite  
 571.2 Cirrosi Epatica Alcolica  
 570 Necrosi Acuta E Subacuta Del Fegato  
 307.1 Anoressia Nervosa  
 070.54 Epatite C Cronica Senza Menzione Di Coma Epatico  
 Procedura: 42.91 Legatura Di Varici Esofagee

Hospitalization

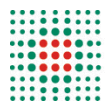
#### Pronte Soccorso 2012 - N. - 3

##### Presso Ospedali Riuniti-Pr

13/02/12 - 13/02/12

Altri Sintomi O Disturbi

Emergency room



Risk profile

Visite specialistiche

Dermatologia  
Gastroenterologia  
Malattie Infettive E Tropicali  
Odontoiatria E Stomatol.

Specialistic visits

Farmaci: N. totale di farmaci nel 2012: 11

**A02 Farmaci Per Disturbi Correlati All'Acidita'**

Lansoprazolo

**A06 Lassativi**

Lattitolo

Lattulosio

**A07 Antidiarroici, Antinfiammatori Ed Antimicrobici Intestinali**

Rifaximina

**B02 Antiemorragici**

Fitomenadione

**C03 Diuretici**

Torasemide

Canrenoato DI Potassio

Furosemide

**C07 Betabloccanti**

Carvedilolo

**J01 Antibatterici Per Uso Sistemico**

Ciprofloxacina

**N03 Antiepilettici**

Fenobarbital

Drugs

Il paziente è stato esposto a politerapia nel 2012, definita come l'uso simultaneo di 5 o più principi

## Taking charge of patients at high risk of hospitalization and frailty

- § Risk Profiles provided to GPs
- § Activation of Professional Teams
  - ü GPs, specialists, nurses, physiotherapists, social workers
  - ü a proactive response...
- § Interdisciplinary Paths
  - ü prevention, clinical appropriateness and adherence, health education...
- § Participation of the Community
  - ü Patients, Caregivers, Associations





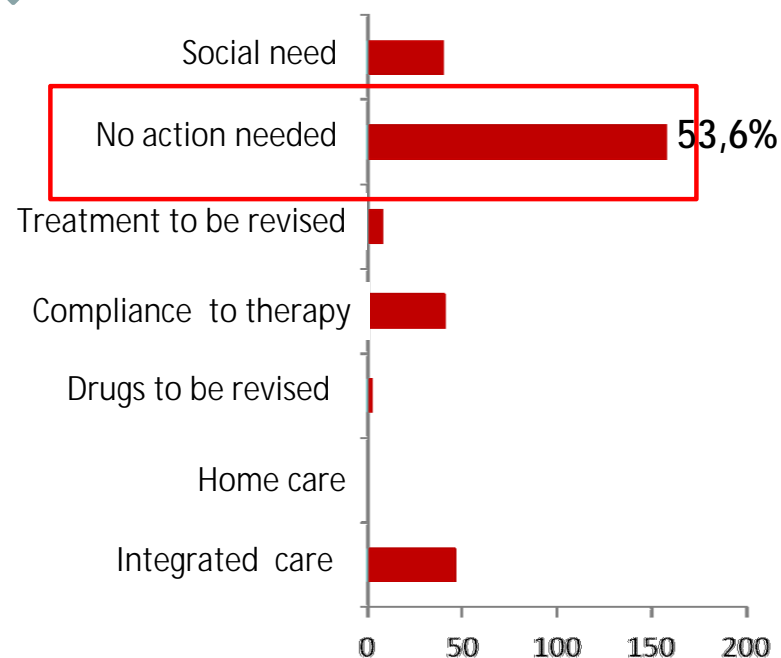
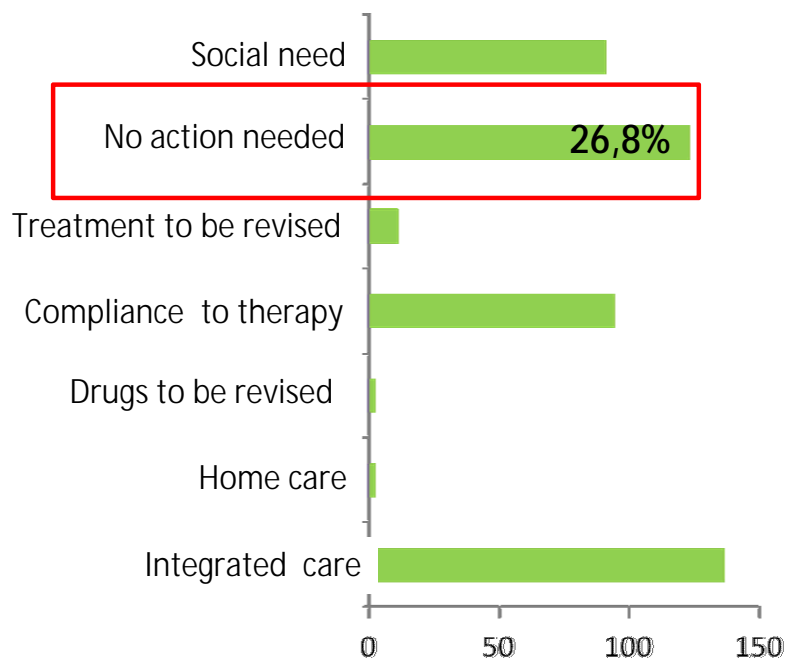
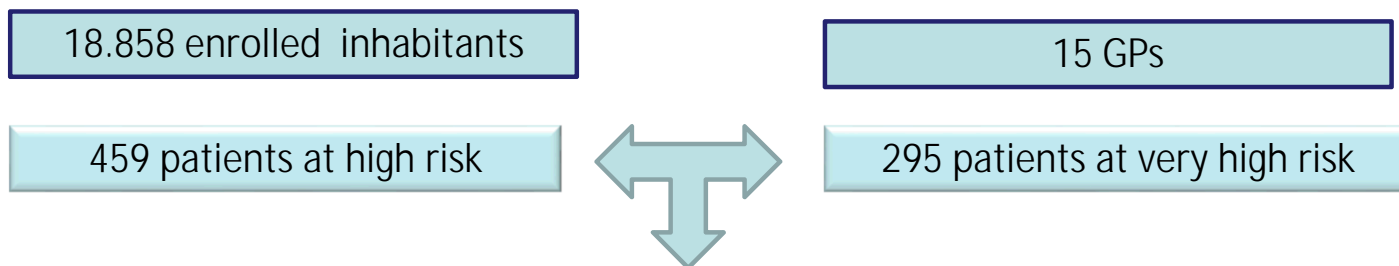
## Does it work?

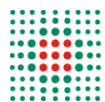
- § 11 Community Health Centres involved
- § **Patient Assessment Chronic Illness Care-PACIC and Patients point-of-view** in cooperation with patients' associations (CHF, diabetes, COPD, ESRD)
- § **Assessment Chronic Illness Care- ACIC and Health care team point-of-view** focus-group: GPs, nurses, social workers, ambulatory specialists, Primary Care Department





# Does it work? Experience in one of the 11 Community Health Center





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<http://salute.regione.emilia-romagna.it/documentazione/multimedia/video/the-one-stop-home-for-healthcare>

## Emilia-Romagna Region

- ü General Directorate for Care of the person, Health and Welfare
- ü Health and Social Regional Agency

