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# Personalized care for chronic patients in an integrated care framework

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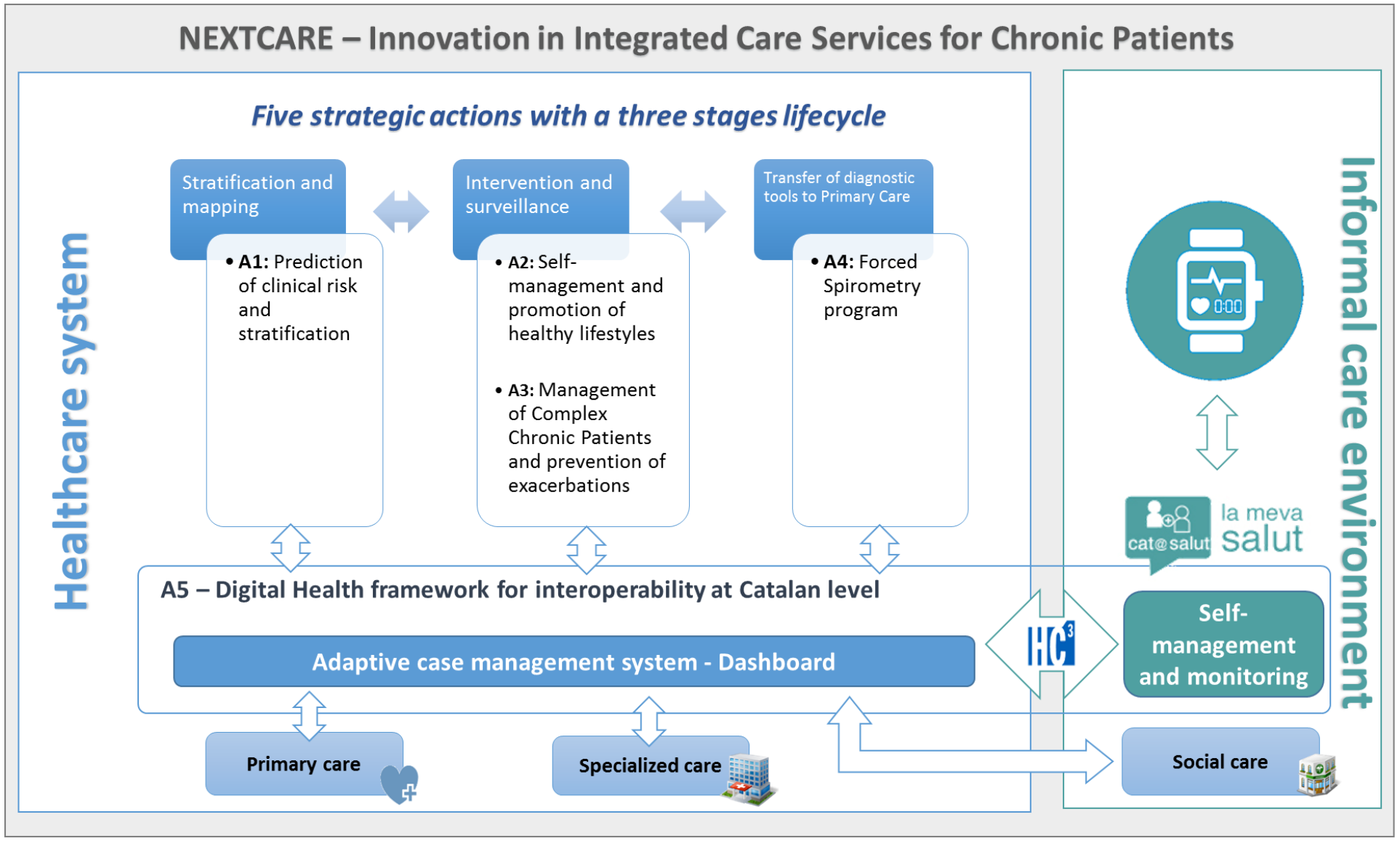
# Regional deployment of ICT-supported integrated care services

*design, evaluation and large scale implementation of five actions aiming at generating healthcare-value at system level*

# Multimorbidity

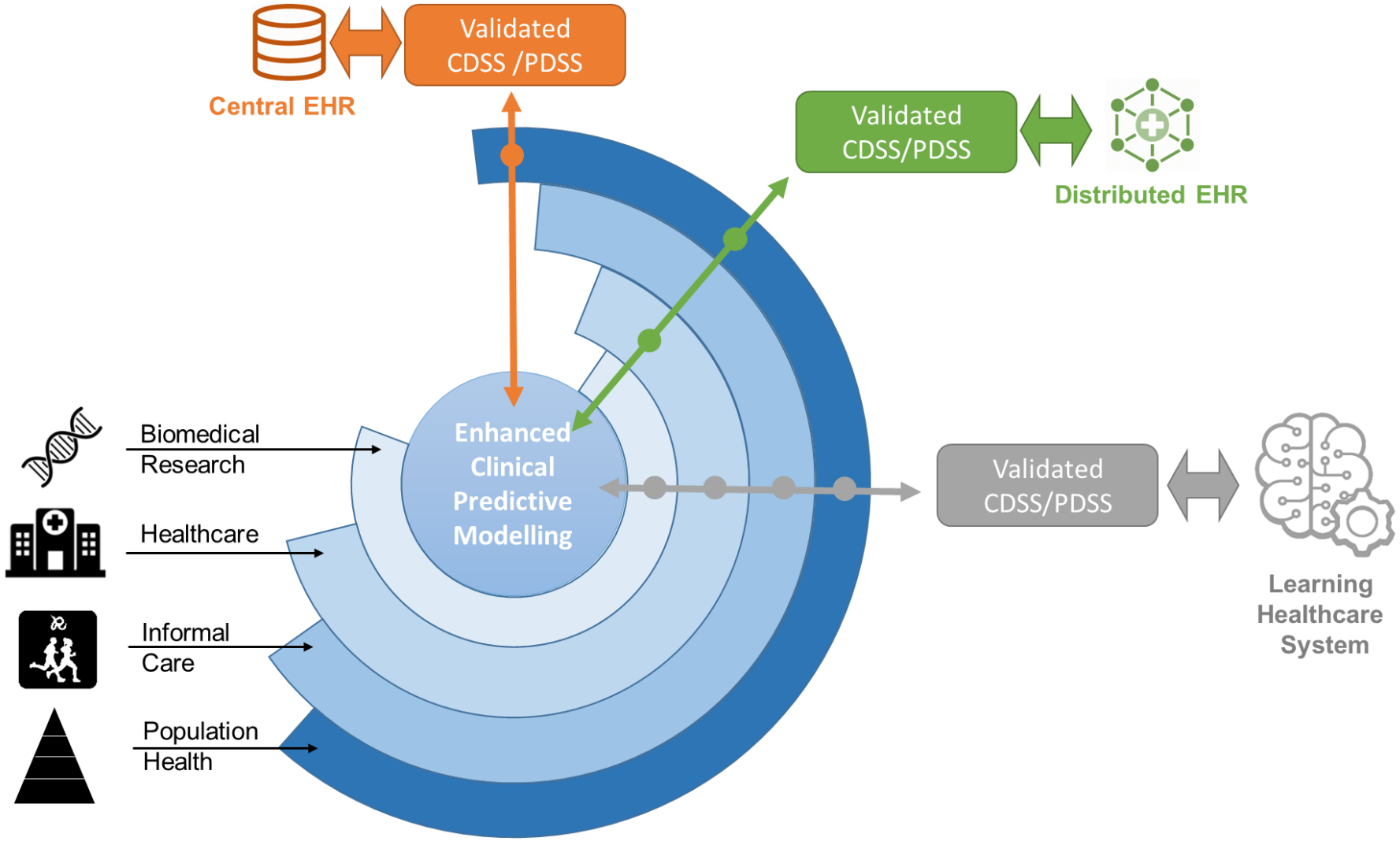
*(cardiovascular diseases; COPD; diabetes type II and anxiety- depression)*

# GRAPHICAL ABSTRACT (2016-2019)



# A1 – Prediction of Clinical Risk and stratification

# Health risk prediction and service selection



# All cases with COPD diagnosis in Catalonia

*264,830 patients*

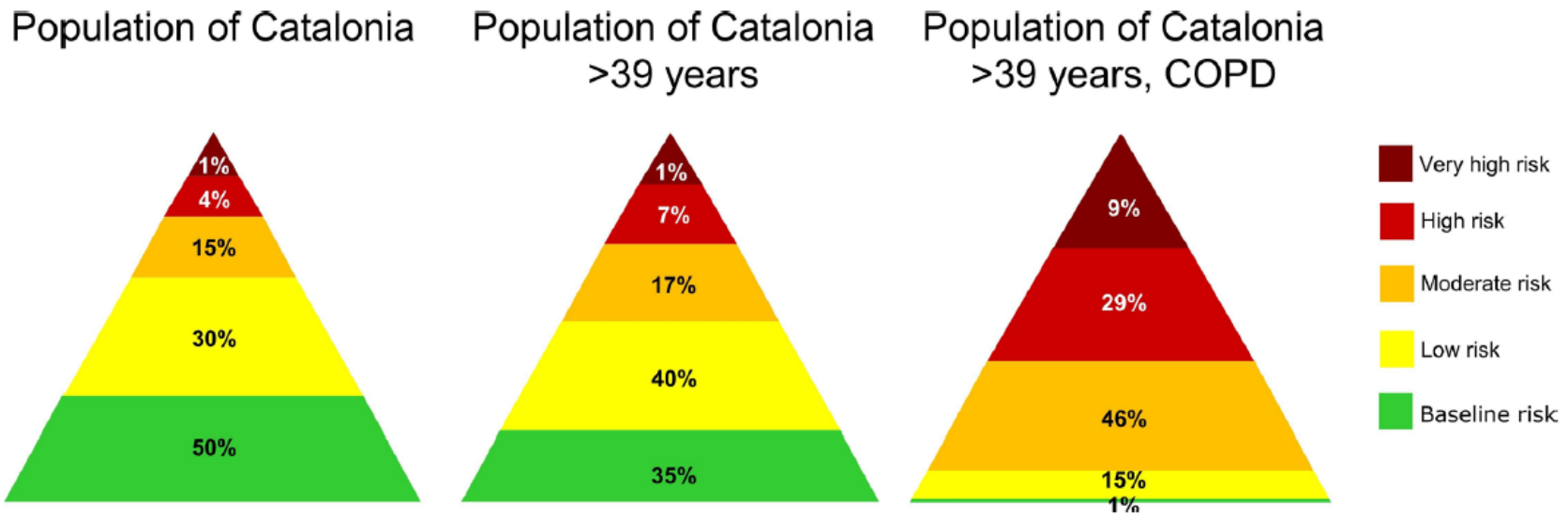



**Table 2** Summary description of the six predictive models

| | Mortality | Hospitalisations | | Multiple hospitalisations | | Users with high healthcare costs (PCT85) |
|---|---|---|---|---|---|---|
| | | All causes | COPD related | All causes | COPD related | |
| C-statistics (AUC) | 0.829 | 0.766 | 0.807 | 0.803 | 0.865 | 0.763 |

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BMJ Open

**Population-based analysis of patients with COPD in Catalonia: a cohort study with implications for clinical management**

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To cite: Vela E, Tényi Á, Cano I, *et al*. Population-based analysis of patients with COPD in Catalonia: a cohort study with implications for clinical management. *BMJ Open* 2018;8:e017283. doi:10.1136/bmjopen-2017-017283

► Prepublication history and additional material for this paper are available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2017-017283).

Received 13 April 2017
Revised 13 December 2017
Accepted 19 December 2017


ABSTRACT

**Background** Clinical management of patients with chronic obstructive pulmonary disease (COPD) shows potential for improvement provided that patients' heterogeneities are better understood. The study addresses the impact of comorbidities and its role in health risk assessment.

**Objective** To explore the potential of health registry information to enhance clinical risk assessment and stratification.

**Design** Fixed cohort study including all registered patients with COPD in Catalonia (Spain) (7.5 million citizens) at 31 December 2014 with 1-year (2015) follow-up.

**Methods** A total of 264 830 patients with COPD diagnosis, based on the International Classification of Diseases (Ninth Revision) coding, were assessed. Performance of multiple logistic regression models for the six main dependent variables of the study: mortality, hospitalisations (patients with one or more admissions; all cases and COPD-related), multiple hospitalisations (patients with at least two admissions; all causes and COPD-related) and users with high healthcare costs. Neither clinical nor forced spirometry data were available.

**Results** Multimorbidity, assessed with the adjusted morbidity grouper, was the covariate with the highest impact in the predictive models, which in turn showed high performance measured by the C-statistics: (1) mortality (0.83), (2 and 3) hospitalisations (all causes: 0.77; COPD-related: 0.81), (4 and 5) multiple hospitalisations (all causes: 0.80; COPD-related: 0.87) and (6) users with high healthcare costs (0.76). Fifteen per cent of individuals with highest healthcare costs to year ratio represented 59% of the overall costs of patients with COPD.

**Conclusions** The results stress the impact of assessing multimorbidity with the adjusted morbidity grouper on considered health indicators, which has implications for enhanced COPD staging and clinical management.


**Strengths and limitations of this study**

- The main strength of the study is that it contributes to risk prediction of relevant clinical events in patients with chronic obstructive pulmonary disease (COPD).
- The study shows high potential to assess health risk factors at population level indicating the high impact of comorbidities. It can contribute to define innovative strategies aiming at reducing the healthcare impact of patients with COPD.
- Full potential of the approach should be proven by integrating registry information and electronic medical records.
- Lack of clinical information, spirometric data and history of tobacco smoking reduces the potential for standardised risk characterisation of patients with COPD.

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is one of the major disorders included in the WHO programme addressing non-communicable diseases.[1] It is estimated that COPD will become the third leading cause of death by 2020.[2] Moreover, projections on COPD prevalence and costs over the next 15 years indicate a rapidly escalating burden, mainly due to population ageing, on both health and social support systems.[3 4]

While acknowledging the progress made in terms of standard of care recommendations,[5] it is accepted that a better understanding of patients' heterogeneities constitutes a key challenge to further enhance both prevention and management of patients with COPD aiming at healthcare value generation.[6 7] Recent studies indicate a high impact of comorbidities on use of healthcare resources in patients with COPD prompting the need for assessing novel integrated care strategies with a patient-oriented approach.[8 9] It is well accepted that several prevalent chronic conditions often occur as clusters of comorbidities in patients with COPD[10–12] and potential explanatory mechanisms for the phenomenon have been proposed.[13 14]

The current study addresses comorbidities in patients with COPD based on the

# A2 – Self-management and promotion of healthy lifestyles

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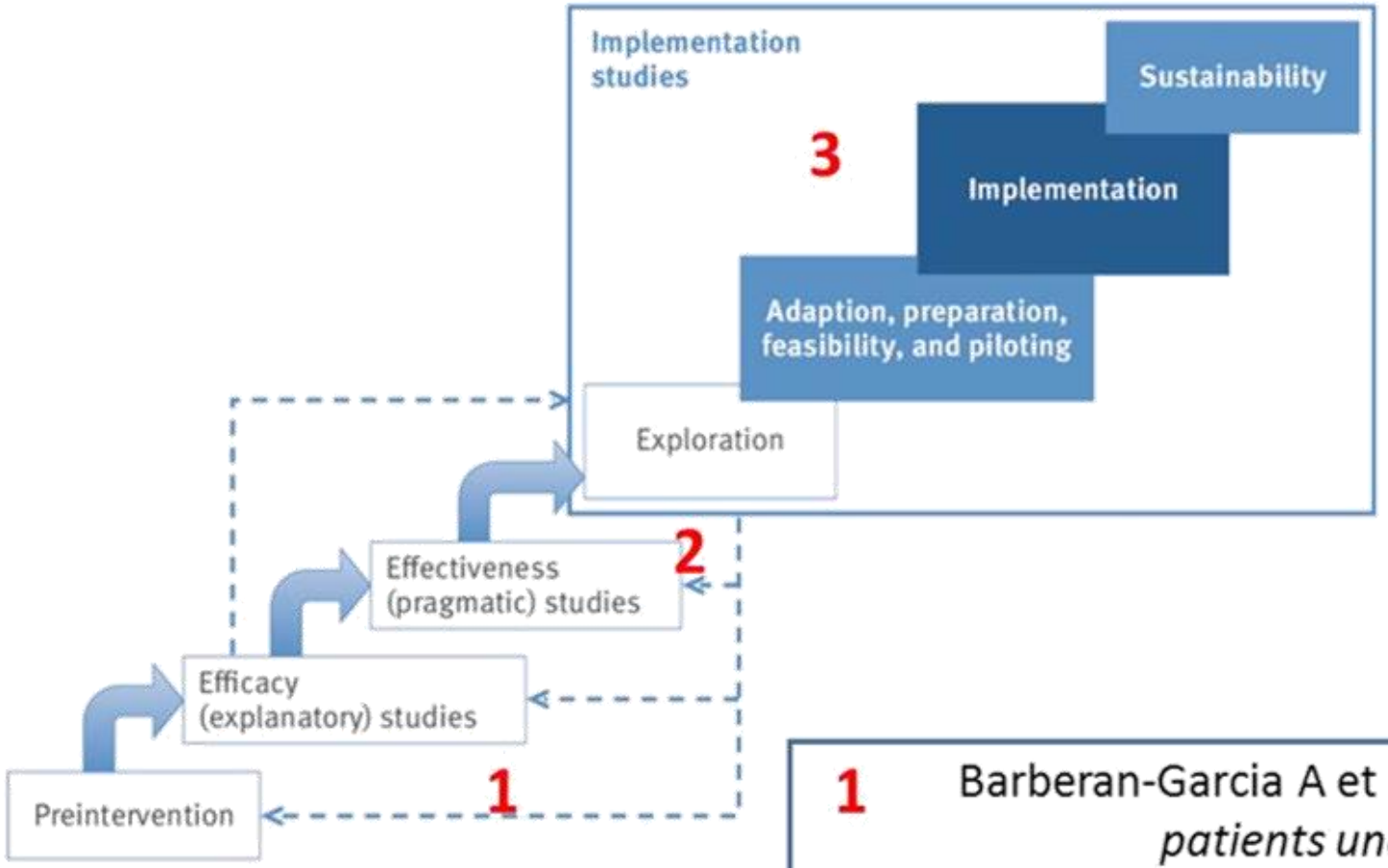
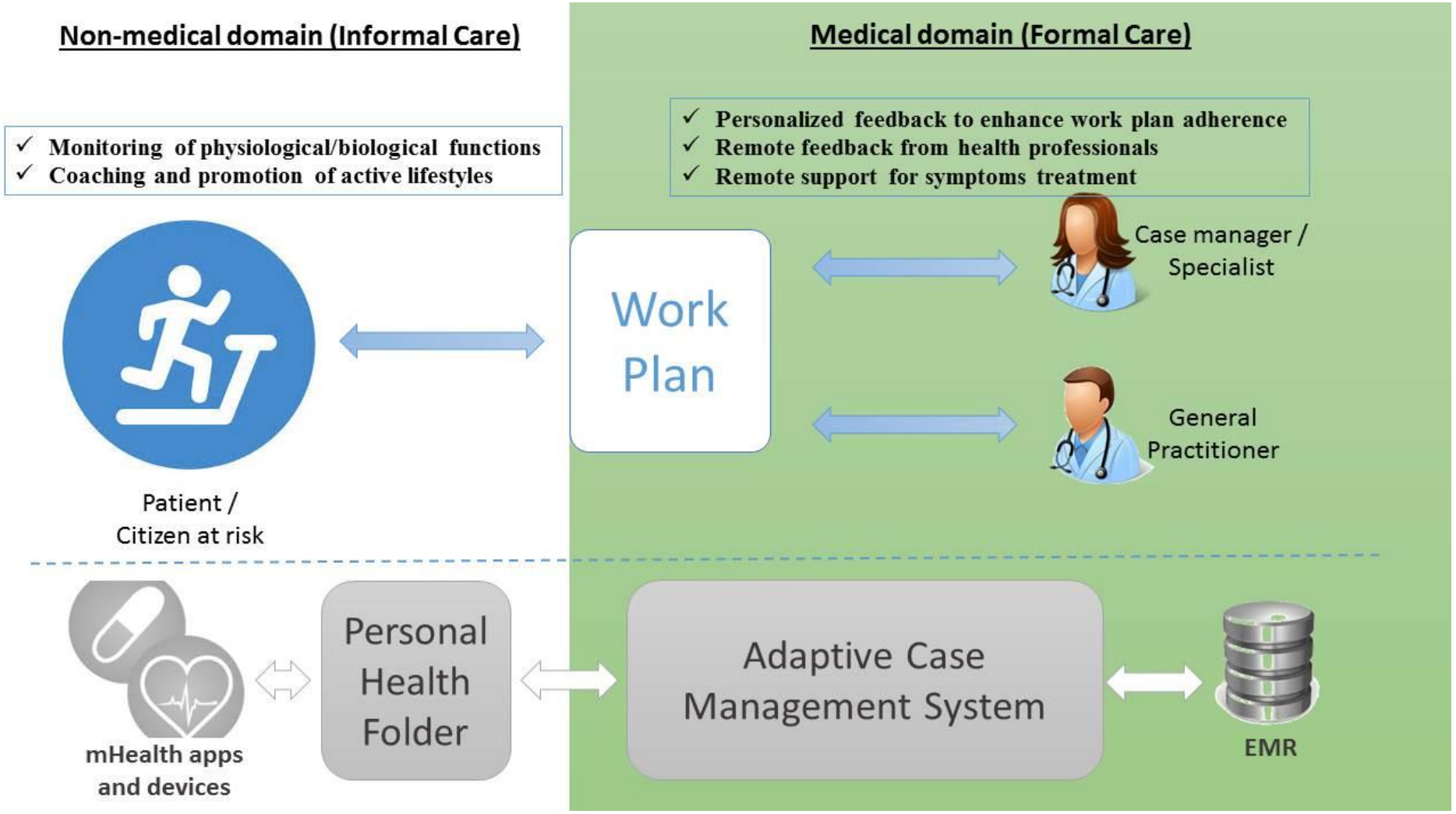
# Prehabilitation




3 *Barberan-Garcia A et al. Protocol for regional implementation of collaborative self-management services to promote physical activity BMC Health Services Research (submitted 2017)*


1 Barberan-Garcia A et al. *Personalized Prehabilitation in High-risk patients undergoing elective major abdominal surgery* Ann Surg. 2017 May 9. doi: 10.1097

# Promotion of physical activity in chronic cases



# A3 – Management of Complex Chronic Patients and prevention of exacerbations

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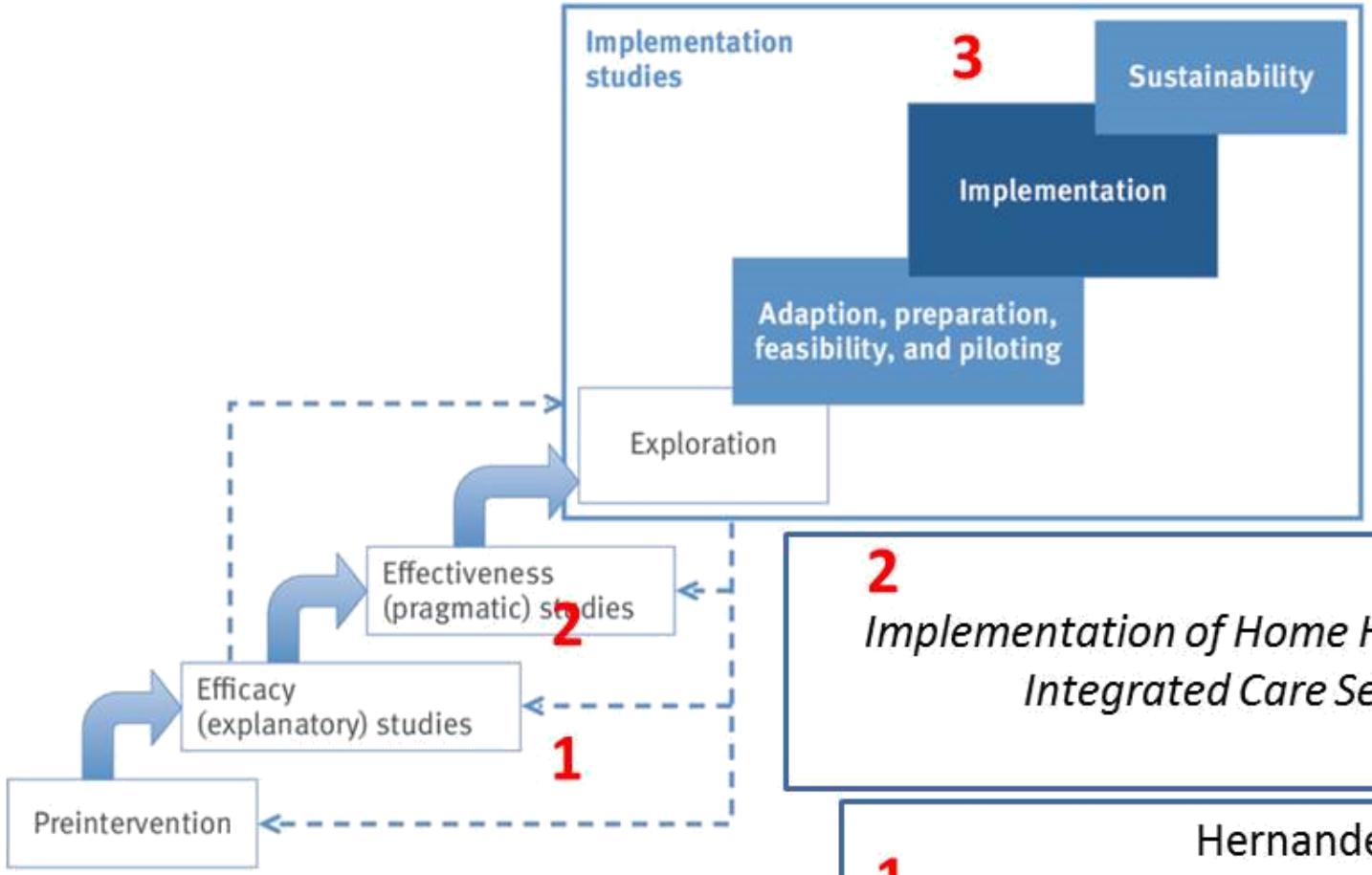
# Home hospitalization & Transitional care




3 Isaac Cano et al. Protocol for Regional Implementation of Community-based Collaborative Management of Complex Chronic Patients *NPJ Prim Care Respir Med. 2017;27(1):44*

2 Hernandez C et al. *Implementation of Home Hospitalization and Early Discharge as an Integrated Care Service: a ten years pragmatic assessment IJIC (submitted 2017)*

1 Hernandez C et al. *Eur Respir J. 2003;21(1):58-67.*
Casas A et al. *Eur Respir J. 2006;28(1):123-30.*
Hernandez C et al. *NPJ Prim Care Respir Med 2015; 25: 15022*
Hernandez C et al. *Int J Integr Care 2015:15: e006.*

# A4 – Transfer of diagnostic tools to Primary Care: Forced Spirometry as use case

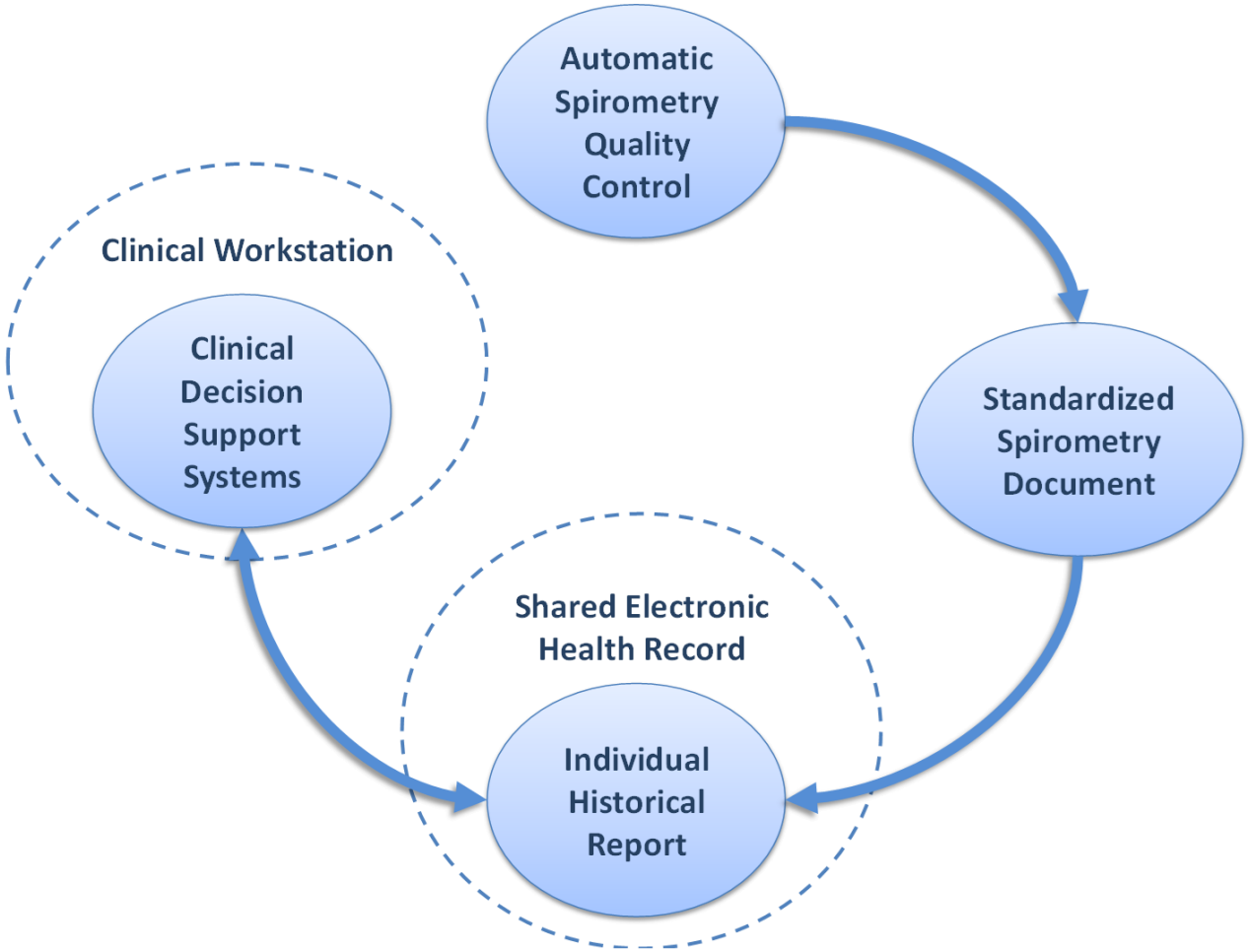
# A4 –TRANSFER OF DIAGNOSTIC TOOLS TO PRIMARY CARE

## *The Forced Spirometry Program*

**Aim:** access to forced spirometry testing (raw data, clinical results, quality control and historical data) from any clinical work-station of any healthcare provider.

After the first year, transferability of the model to other healthcare environments and other diagnostic techniques will be analyzed.

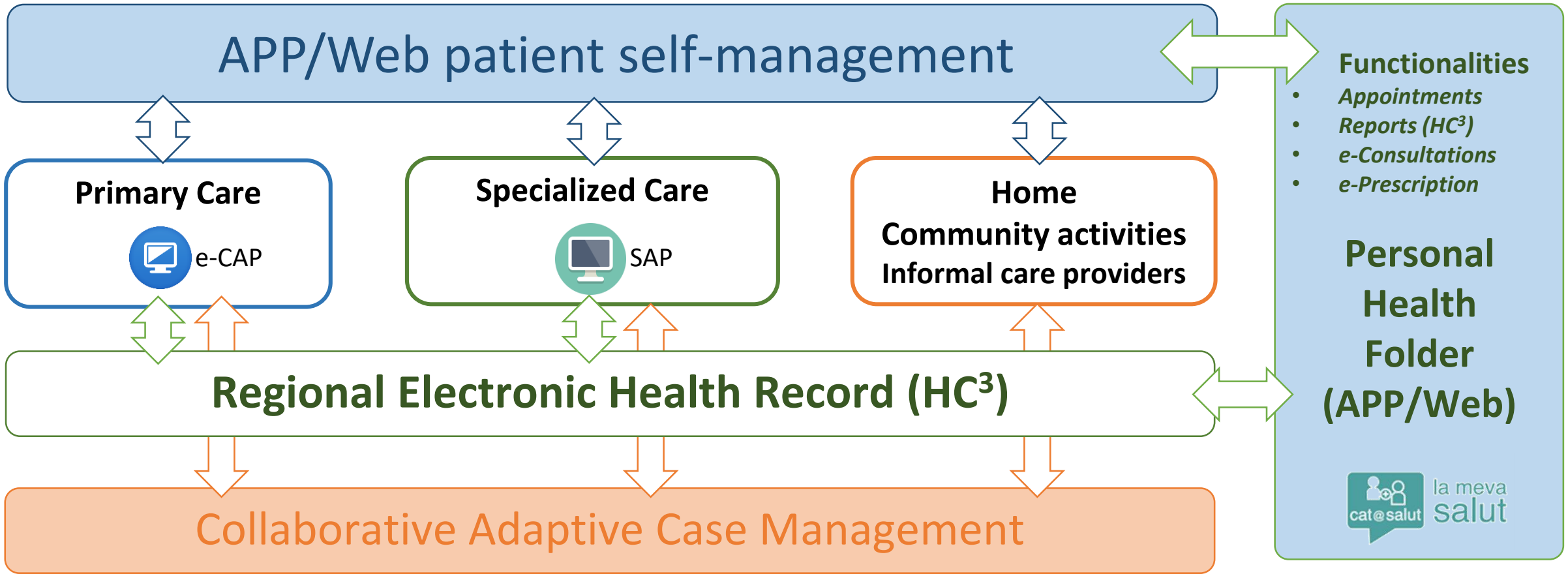
The new system will allow the future implementation of "data analytics" with impact on case management.




Vargas C et al. *NPJ Prim care Respir Med* 2016;26:16024.

# A5 – Digital Health Framework for Interoperability at Catalan level

# A5 –INTEROPERABILITY – DIGITAL HEALTH FRAMEWORK



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# *ICT – supported health services*

**Biomedical knowledge** *(healthy life styles-chronicity-rehabilitation)*

**Enhanced health risk assessment** *(predictive modelling – CDSS/PDSS)*

**Cloud-based computing – data analytics**

**Business-friendly ecosystem** *(with Cataloniabio&Health tech)*

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# Thanks
# Graciès

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