



# Integrated care pathways for airway diseases (AIRWAYS-ICPs)

European Innovation Partnership on Active and Healthy Ageing, Action Plan B3 Mechanisms of the Development of Allergy (MeDALL, WP10)  
GARD (Global Alliance against Chronic Respiratory Diseases, WHO) research demonstration project

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**ABSTRACT** The objective of Integrated Care Pathways for Airway Diseases (AIRWAYS-ICPs) is to launch a collaboration to develop multi-sectoral care pathways for chronic respiratory diseases in European countries and regions. AIRWAYS-ICPs has strategic relevance to the European Union Health Strategy and will add value to existing public health knowledge by: 1) proposing a common framework of care pathways for chronic respiratory diseases, which will facilitate comparability and trans-national initiatives; 2) informing cost-effective policy development, strengthening in particular those on smoking and environmental exposure; 3) aiding risk stratification in chronic disease patients, using a common strategy; 4) having a significant impact on the health of citizens in the short term (reduction of morbidity, improvement of education in children and of work in adults) and in the long-term (healthy ageing); 5) proposing a common simulation tool to assist physicians; and 6) ultimately reducing the healthcare burden (emergency visits, avoidable hospitalisations, disability and costs) while improving quality of life. In the longer term, the incidence of disease may be reduced by innovative prevention strategies. AIRWAYS-ICPs was initiated by Area 5 of the Action Plan B3 of the European Innovation Partnership on Active and Healthy Ageing. All stakeholders are involved (health and social care, patients, and policy makers).



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AIRWAYS-ICPs: launch of a collaboration to develop multi-sectoral integrated care pathways for respiratory disease <http://ow.ly/v35Gh>

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## Introduction

### *Chronic respiratory diseases: from guidelines to policies*

Chronic respiratory diseases are major non-communicable diseases [1]. Asthma and allergic diseases occur throughout the life cycle and can begin during pregnancy and childhood. In Europe, they affect 30 million children and adults under 45 years of age. Chronic obstructive pulmonary disease (COPD) has an estimated annual death rate of over 4 million people globally. Among the European Union (EU) member states, asthma accounted for an average of 53 hospital admissions per 100 000 population in 2009, and the average COPD-related admission rate was 184 [2]. The annual direct and indirect costs in the 28 EU countries due to COPD or asthma are estimated at €48 billion and €34 billion, respectively [2]. Chronic respiratory diseases affect active and healthy ageing. Asthma in children or adults is a common risk factor for COPD in adults [3, 4].

Guidelines for COPD [5] and rhinitis–asthma comorbidity [6] exist using the GRADE (Grading of Recommendations Assessment, Development and Evaluation) approach [7, 8]. Global strategies have also been proposed for the prevention and control of asthma [9] and COPD [10]. However, in older adults, it is often difficult to differentiate between asthma and COPD [11], and none of the current guidelines appear to have a specific module for older people [12].

Effective strategies are needed to reduce chronic respiratory disease burden. National programmes (e.g. the Finnish, Czech or Portuguese asthma or COPD programmes [13, 14]) can be cost-effective [15], but they are insufficiently implemented in the EU. Integrated care pathways (ICPs) for COPD (QS10) exist in the UK (National Institute for Health and Care Excellence, NICE) [16], in France (Haute Autorité de Santé) and in the Netherlands [17–19], but ICPs for asthma or asthma and rhinitis comorbidity do not exist. Asthma quality standards for asthma (QS25) have been published by NICE [20]. These are specific, concise statements that act as markers of high-quality, cost-effective patient care. Moreover, some initiatives are aimed at also incentivising good practice and improving implementation (*i.e.* remuneration based on performance indicators). In the UK, the Quality and Outcomes Framework has four asthma-specific performance indicators which are explicitly linked to the subsequent remuneration of providers [21].

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In low-resource settings, some successful attempts to combine all non-communicable diseases into one single action plan have been developed [22–24] for the implementation of the World Health Organization (WHO) non-communicable disease action plan. However, such combined plans are not available for the management of non-communicable diseases in high-resource settings.

The Polish Presidency of the EU Council (3051st Council Conclusions) has made the prevention, early diagnosis and treatment of asthma and allergic diseases a priority to reduce health inequalities [25, 26]. The 3206th Cyprus Council Conclusions recommended that the diagnosis and treatment of chronic diseases should be initiated as early as possible to improve active and healthy ageing [27]. A debate at the European Parliament (Cyprus Presidency of the EU Council, 2012) recommended early diagnosis and management of chronic respiratory diseases in children in order to promote active and healthy ageing [28].

### ***Protective and risk factors***

Chronic respiratory diseases and other non-communicable diseases often share environmental risk factors (e.g. tobacco, nutrition, indoor and outdoor air pollution, and sedentary lifestyle) [1, 29], leading to sustained local and systemic inflammation [30, 31] and impaired ageing. Tobacco smoking is the best-identified risk factor for many non-communicable diseases, including chronic respiratory disease.

The prevention and control of chronic diseases could be considered sequentially before the disease has been identified in order to 1) prevent its onset (health promotion and primary prevention), and 2) better control and prevent the short- and long-term consequences after its onset (secondary and tertiary prevention and control).

Starting in early childhood, the foundations for healthy or weakened respiratory organs are laid from a political perspective to feed into the goals of the Europe 2020 strategy as well as healthy and active ageing [32]. Multi-sectoral prevention, including policy change, regulation and market intervention, is of the highest priority.

### ***Integrated care pathways***

ICPs, also known as clinical pathways or care pathways, are structured multidisciplinary care plans which detail essential steps in the care of patients with a specific clinical problem [33]. They promote the translation of guidelines into local protocols and their subsequent application to clinical practice. An ICP forms all or part of the clinical record, documents the care given, and facilitates the evaluation of outcomes for continuous quality improvement [34]. ICPs empower patients as well as their health and social carers.

ICPs differ from practice guidelines as they are utilised by a multidisciplinary team, and focus on the quality and co-ordination of care. ICPs need to record variations from planned care [35]. An ICP is intended to inform and encourage thought and adaptation. Clinicians are free to exert their own professional judgments as appropriate. However, any alteration to the practice identified within the ICP must be noted as a variance [36]. Variance analysis may be used to optimise the ICPs linked with pay-for-performance [37–40], audit and feedback, and integration of recommendations with electronic medical records.

ICPs are already the standard of care in different areas of medicine, such as oncology [41] or palliative care [42]. Some have already been proposed for asthma or COPD.

The care pathways simulator, a discrete event simulation software programme, helps to view the system from the perspective of the task, job or patient, rather than of the function [43]. Service redesign, targeted at improving services, can bring benefit to patients, carers, staff and National Health Service (NHS) trusts [44].

### ***European Innovation Partnership on Active and Healthy Ageing***

European innovation partnerships attempt to enhance EU competitiveness and to tackle societal challenges by fostering innovation. They address the weaknesses in EU research and innovation that complicate the discovery or exploitation of knowledge and may hinder innovation into the market place.

Active and healthy ageing is a major societal challenge common to all countries and to all populations [45]. Ageing is intertwined with socioeconomic inequalities [46], is an under-appreciated cause of poverty and hinders economic development, particularly affecting underserved populations and females. Active and healthy ageing needs to be promoted very early in life to be successful.

The European Innovation Partnership on Active and Healthy Ageing (EIP on AHA) is deployed in three areas and six action plans [47]:

- Prevention of diseases and health promotion
  - Innovative ways to ensure that patients adhere to their treatments (A1)
  - Innovative solutions for personalised health management, with focus on falls prevention (A2)
  - Action for preventing functional decline and frailty, with a particular focus on malnutrition (A3)
- Care and cure: scaling up and replication of successful innovative integrated care models for chronic diseases among older patients, such as through remote monitoring (B3)
- Active and independent living of older adults by improving the uptake of interoperable independent living solutions including guidelines for business models (C2)
- Horizontal topics: networking and knowledge sharing on innovation for age-friendly environments (D4)

The EIP on AHA aims to provide a framework for supporting bottom-up innovations and a forum for professional collaboration. The partners work on a voluntary basis to pool their knowledge and expertise in order to deploy, scale-up and replicate innovative health and care services.

The implementation of the strategy and action plan of WHO Europe on healthy ageing [48] has synergies with a number of the priorities and actions identified in the strategic implementation plan of the EIP on AHA, and shares its positive vision of ageing.

### Objectives of AIRWAYS-ICPs

The general objective of AIRWAYS-ICPs is to develop multi-sectoral ICPs for CRDs used across European countries and regions in order to 1) reduce the burden of the diseases, 2) promote active and healthy ageing, and 3) create a care pathways simulator tool which can be applied in older adults. AIRWAYS-ICPs will not duplicate existing EU prevention programmes in chronic respiratory diseases (e.g. anti-smoking) but will strengthen them where appropriate.

The aim of AIRWAYS-ICPs is to propose central unifying themes and an overall potential to gain political leverage in the current environment and to better understand and manage the spectrum of care for patients with chronic airway disease in European countries and regions. It will also aim to generalise the approach to the uniform definition of severity, control and risk of severe asthma presented to the WHO [49], as well as of allergic diseases [50], in order to develop a uniform risk stratification usable for chronic respiratory diseases in most situations.

AIRWAYS-ICPs will propose a feasible, achievable and manageable project from science to guidelines (fig. 1) using existing networks and partners committed to Action Plan B3 of the EIP on AHA.

Specific objectives include the following:

- 1) To collect guidelines and ICPs that exist in European countries and regions for airway diseases (asthma, COPD and rhinitis).
- 2) To strengthen prevention and health promotion for airway diseases.
- 3) To stratify patients with severe chronic respiratory diseases.
- 4) To understand AIRWAY diseases in children and adolescents and to develop ICPs (P.A.R.IS).

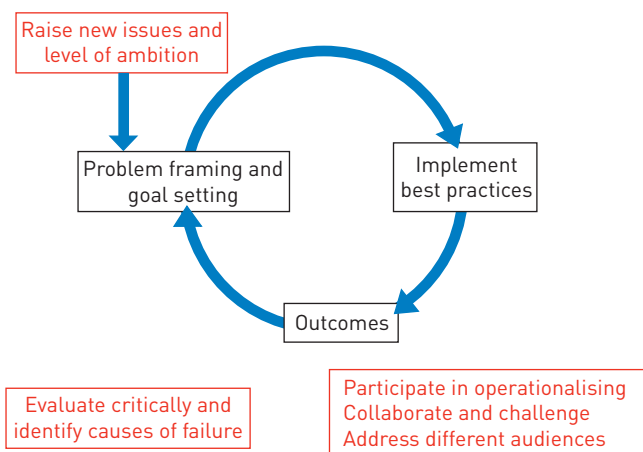


FIGURE 1 From science to guidelines and best practices.

- 5) To develop important questions on chronic respiratory diseases for older people.
- 6) To understand and overcome barriers in chronic respiratory disease management.
- 7) To develop ICPs for rhinitis and asthma comorbidity across the life cycle, and for COPD and asthma in older people, combining preventive and disease control strategies based on existing national (or regional) programmes (e.g. Finnish or Portuguese asthma, COPD and allergy programmes).
- 8) To develop a simulation tool of ICPs for rhinitis and asthma comorbidity that could be applied to older people and to redesigning care pathways.
- 9) To tackle chronic respiratory diseases across the life cycle, placing a particular interest in the cultural and social aspects of the diseases in a project centred on the patient.
- 10) To implement multi-sectoral, multi-country initiatives to allow the practical use of AIRWAYS-ICPs by European countries and regions, and beyond to other countries, for cost-effective policies on the prevention and control of asthma, COPD and allergy.

### **AIRWAYS-ICPs working group**

The AIRWAYS-ICPs working group has included the WHO Global Alliance against Chronic Respiratory Diseases and WHO Collaborating Center (2001–2013) working groups (64 countries). Moreover, we have attempted to include as many European countries as possible (23 EU countries) and it should be noted that Serbia, Croatia, Slovenia and Slovakia, who were not included in the previous study groups, are now included with a large number of representatives. Moreover, we have enhanced the study group by including social carers and public health researchers. Patients are well represented. In some countries, the names of the representatives have been proposed by governmental organisations. Finally, through the EIP on AHA, European Regions and Health Authorities (EUREGHA), other representatives were included, in particular NHS England, Scotland and Northern Ireland, as well as Wallonie and Southern Denmark. The working group now includes all the stakeholders required for the development of multi-sectoral ICPs.

### **AIRWAYS-ICPs**

#### ***1) To collate existing ICPs, national programmes and guidelines***

Tools used in the 28 EU countries and other European countries will be collected with regards to ICPs for COPD, asthma and rhinitis. This approach will be deployed to other countries. A repository is being developed by the EIP on AHA to collect projects such as:

- 1) Good practices of the B3 Action Group on integrated care.
- 2) The Finnish plans for asthma [13], allergy [51] and COPD [14] which are considered to be the prototypes of national plans for chronic respiratory diseases. Polastma (Poland) is, in particular, derived from the asthma plan.
- 3) The Portuguese National Programme for Respiratory Diseases (PNDR), the first national programme to include all respiratory diseases.
- 4) Care pathways provided by national institutions (e.g. NICE in the UK or the Haute Autorité de Santé in France).
- 5) The WHO guidelines for asthma and COPD in low-income settings.
- 6) A common approach to severe asthma and allergic diseases.
- 7) International Primary Care Respiratory Group mapping of national guidelines used by primary care for COPD, asthma, rhinitis, community-acquired pneumonia, obstructive sleep apnoea and smoking cessation [52].

#### ***2) To strengthen EU policies for the prevention of chronic respiratory diseases***

The European Commission addresses chronic respiratory disease as a key priority and includes legislation on tobacco consumption and ambient air quality, work on climate change, and actions under the European Environment and Health Strategy. These policies tie in with active Commission support for the current United Nations process to address non-communicable diseases and related socioeconomic and environmental determinants. There is an urgent need to strengthen prevention and health promotion, in particular for smoking cessation (“Health for Growth” public health programme), improved physical and social environment, and promotion of lifestyle of beneficial value for “whole of society” and “vulnerable groups” in particular [53].

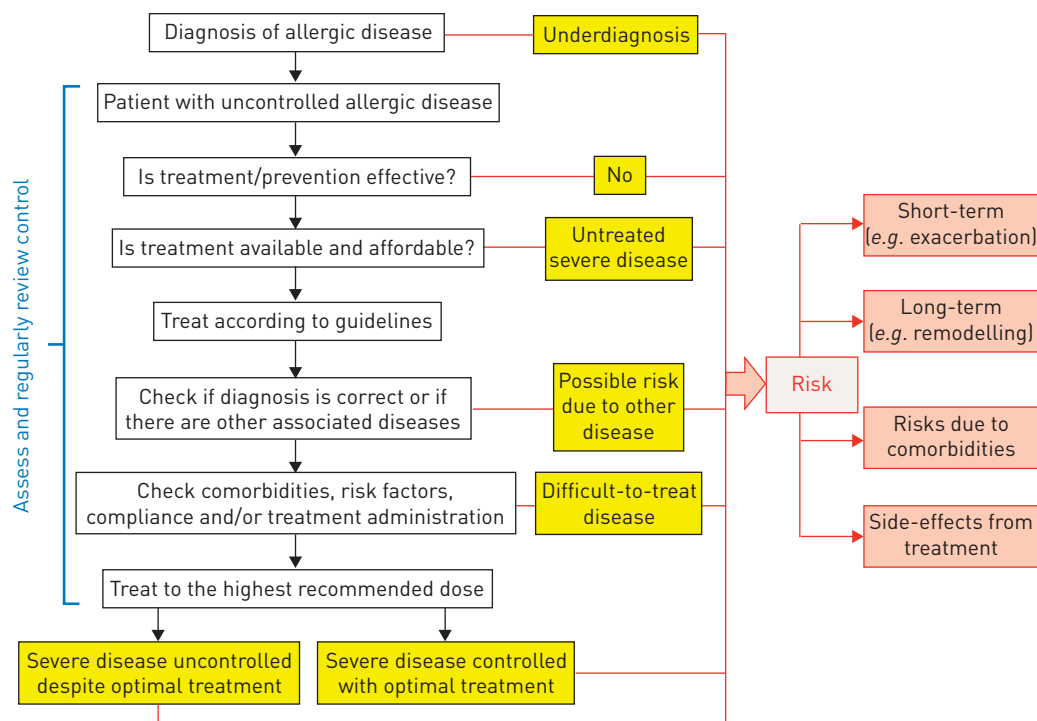


FIGURE 2 Decision-making steps for the stratification of severe allergic disease, with correlating action steps for management. Reproduced from [50] with permission from the publisher.

### 3) Stratification of patients with severe chronic respiratory diseases

Severity is the intrinsic severity of the disease process, control is the degree to which therapy goals are met, and responsiveness is the ease with which control is achieved by therapy. The concept of severity and control has been largely developed for asthma in guidelines [54]. The uniform definition of severe asthma [55] presented to the WHO [49] used an approach derived from the National Asthma Education and Prevention Program Expert Panel Report 3 guidelines [56]. This approach has also been used for all allergic diseases (fig. 2) [50] and may be used for COPD (table 1).

The stratification of patients with chronic respiratory diseases can be generalised using the approach of the uniform definition of severe asthma presented to the WHO [55], in order to have a uniform definition of severity, control and risk usable in most situations. This uniform definition will make it possible to better define the phenotypes of severe allergic (and related) diseases for clinical practice, research (including epidemiology), public health purposes and the development of novel therapies targeted to better defined phenotypes.

### 4) Understanding airway diseases in children and adolescents and developing ICPs (P.A.R.IS)

Allergic diseases and asthma often start early in life, and most patients will have developed disease before the age of 18 years. It is therefore important to understand the risk factors and mechanisms underlying allergic chronic respiratory diseases and asthma in childhood, as well as to determine the gaps in the management of these diseases in preschool children, school children and adolescents. The prevention of early diagnosis and the management of chronic respiratory diseases in children is vital for the improvement of active and healthy ageing.

Within the framework of the EIP on AHA, the European Academy of Allergy and Clinical Immunology (EAACI) has decided, in collaboration with Allergic Rhinitis and its Impact on Asthma (ARIA), to develop a programme to better understand AIRWAY diseases in children and to propose a framework for the development of ICPs in this age group, considering rhinitis and asthma as a single entity.

The Allergy Sentinel Network, approved by the European Parliament, will be developed in Paris [28].

### 5) Development of important questions on chronic respiratory diseases for older people

Clinically important questions on the diagnosis and management of chronic respiratory diseases in older adults will be defined using a three-step Delphi process. The questions include COPD, asthma, rhinitis and chronic respiratory disease comorbidities. Multi-sectoral experts and patients are included.



TABLE 1 Stratification steps for severe asthma and chronic obstructive pulmonary disease (COPD)

|   | Asthma  | COPD  |
|---|---|---|
| <b>Underdiagnosis</b>                                   | Common<br>If asthma is not diagnosed, severe exacerbations can occur<br>Asthma deaths mostly occur in untreated patients<br>In occupational asthma, early diagnosis is needed | Extremely common<br>Patients usually consult when they have (very) severe disease or an exacerbation<br>If diagnosed earlier, smoking cessation measures could be initiated and prevent the worsening of COPD and comorbidities   |
| <b>Effective treatment</b>                              |   |   |
| Preventive treatment                                    | Asthma prevention is not effective, except in some cases, such as occupational asthma   | Smoking cessation effective (at least when started early)   |
| Drugs   | Inhaled corticosteroids and $\beta_2$ -agonists very effective on symptoms and control<br>At regular doses, no treatment is clearly effective on remodelling                  | Somewhat effective on symptoms<br>High variability due to different COPD phenotypes (e.g. chronic bronchitis and emphysema)<br>Modestly effective on exacerbations, possibly because phenotypes are not well characterised and COPD encompasses several different phenotypes which may respond differently to drugs<br>No treatment effective on decline of lung function |
| <b>Treatment availability and affordability</b>         |   | A global problem  |
| <b>Differential diagnosis</b>                           | Many “uncontrolled” patients with current asthma medications have asthma and another disease or another disease (e.g. bronchiectasis)   | Many COPD patients have a differential diagnosis (including lung cancer)  |
| <b>Compliance and literacy</b>                          | For drugs   | For smoking cessation   |
| <b>Inhaler misuse</b>                                   |   | A global problem  |
| <b>Smoking and other risk factors</b>                   |   | A global problem  |
| <b>Comorbidities</b>                                    | Severe nasal problems (e.g. polyposis) may impair asthma control  | Key problem: many patients with COPD have severe comorbidities that may not even be diagnosed<br>Many deaths are due to comorbidities   |
| <b>Mood, depression and socioeconomic status</b>        |   | A global problem  |
| <b>Controlled disease with high intensity treatment</b> | A large number of patients fall into this category<br>If treatment is stopped, exacerbations can occur quickly  | Phenotypes are not well characterised and COPD encompasses several different diseases (e.g. chronic bronchitis and emphysema) that may respond differently to drugs<br>Phenotypic characterisation is urgently needed   |

First Delphi round: experts were asked to propose the three major problems they would like to have answered concerning disease in older people, including comorbidities.

Second Delphi round: the questions were assessed by a group of four experts (two methodologists) to check for redundancy among the questions proposed (similar wording).

Third Delphi round: the questions were sent to the group for agreement.

Fourth Delphi round: the harmonised questions will be sent to 60 experts who will rank them.

The prioritised questions include: 1) asthma in older people; 2) COPD in older people; 3) rhinitis in older people; 4) comorbidities of asthma and COPD in older people; and 5) how paediatric interventions have an impact on ageing associated with respiratory diseases.

The list of questions will also be customised in order to be applicable to all countries and targeted to low, middle and high-income settings within which socioeconomic and health problems differ. The third Delphi round will be reviewed by two expert panels: one from developing countries and another from developed countries.

The prioritised questions will be answered after a review of available evidence using the GRADE approach.

Further to the first completed steps, it was felt that a better definition was needed for airway diseases and how they cluster in comorbidities (respiratory and non-respiratory). There are likely to be differences within the life cycle.

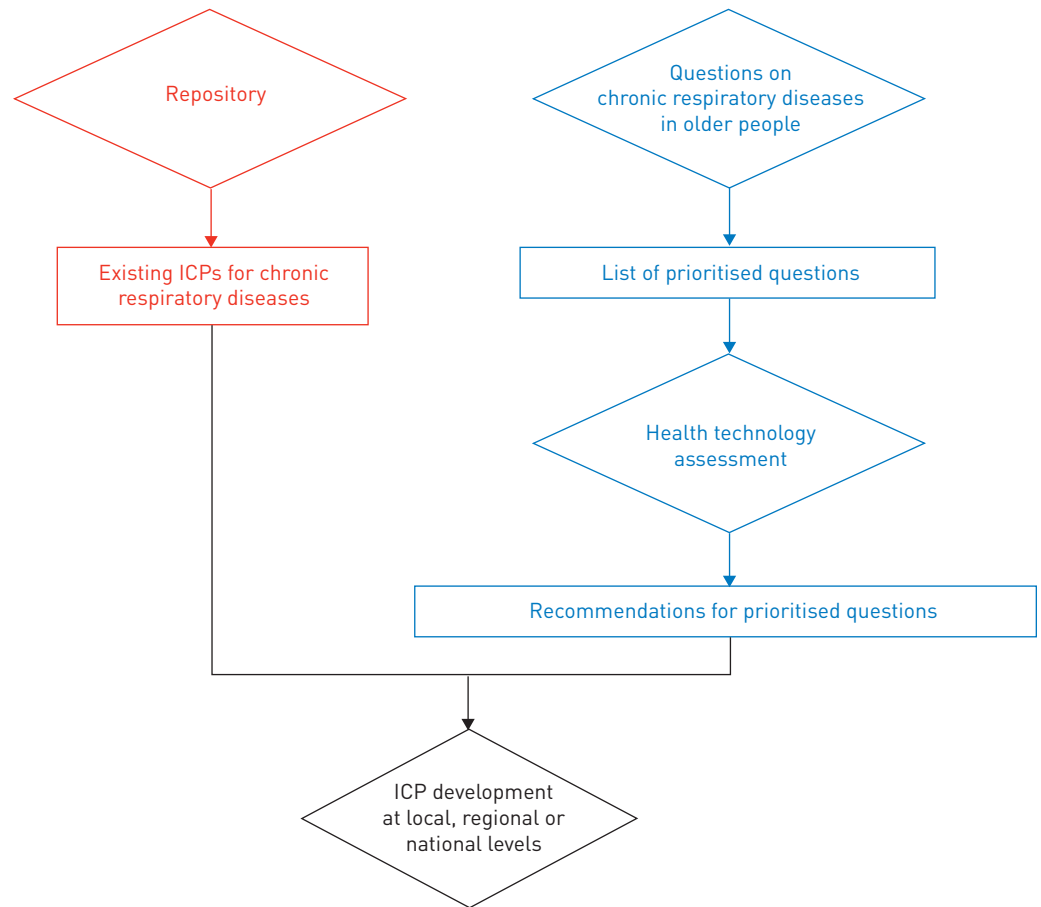


FIGURE 3 Development of integrated care pathways (ICPs).

#### **6) Understanding and overcoming barriers in chronic respiratory disease management**

Many barriers exist and prevent the deployment and use of a non-communicable disease global approach in different settings and countries.

#### **7) Development of ICPs for rhinitis and asthma comorbidity across the life cycle, and for COPD, asthma and comorbidities in older people**

- 1) To develop multi-sectoral ICPs which can be used across Europe and in other countries.
- 2) For asthma and rhinitis comorbidity, the P.A.R.IS approach (EAACI-ARIA) will be used in children and the ARIA approach in adults and older people.
- 3) A combined approach to asthma and COPD has been proposed for older people, as the two diseases overlap and are often difficult to differentiate, particularly at the primary care level. Moreover, non-respiratory comorbidities will be included since older patients often have several diseases with poly-pharmacy.
- 4) To combine strategies for prevention and control.
- 5) To place a special emphasis on older and/or underserved patients.
- 6) To implement cost-effective policies for the prevention of chronic respiratory diseases.
- 7) To promote active and healthy ageing. AIRWAYS-ICPs places a particular interest in cultural and societal aspects of the diseases in a project centred on the patient.
- 8) Interactions will take place between several sections of AIRWAYS-ICPs in order to develop ICPs (fig. 3). Health technology assessment will lead to recommendations that will be evaluated in each country (or EU region) in order to develop multi-sectoral ICPs which may differ depending on the differences within the health systems, and on the socioeconomic and political priorities of the different countries.

### **8) Redesign care pathways using simulator tools (in older people)**

Health costs associated with the long-term care of older people have increased in all countries. Computer-based simulation tools may provide integrated care services to older people. The simulation is used for decision-making in healthcare systems by increasing efficiency and reducing unnecessary cost, while maintaining or improving quality of care [57]. It is linked to the processes of change or reform of the system [58], and is used as a tool to address the complexity of healthcare systems (healthcare ecosystem) in which all stakeholders interact (patients, managers, policy makers and professionals). Examples are applied to infectious diseases [59]. The simulation allows the identification of treatment effects in longitudinal healthcare data [60], preventing technology-induced errors in healthcare [61]. In the area of “AIRWAYS ICPs”, computational analysis has been used to analyse the role of asthma in airway mechanics parameters [62].

LTCMAS (Long-Term Care Multi-Agent Systems) [63] is a simulator that, as a starting point, used a holistic model of care systems for people that need long-term care, the Sustainable Socio-Health Model (SSHM). The implementation of the simulator on the Jason multi-agent platform allows the tool to include human interactions, preferences and social abilities that take place between older people and the staff of healthcare systems (health and social workers). The use of this multi-agent platform provides the required scalability for simulating population sizes of different orders of magnitude. The closed-loop design of the proposed simulator permits repeated simulation of successive interactions of the target population with the healthcare system. The simulator may forecast the long-term effects of different policies on the considered population as well as on the healthcare system.

Using the Spanish simulation tool LTCMAS [63] as a prototype, a new version will be adapted to the AIRWAYS patient group (LCT+ AIRWAYS ICPs). LCT+ AIRWAYS ICPs will be available in primary care centres through health information systems to assist physicians in the stratification of patients and choice of pathways, including an attempt to include resource use/cost implications.

### **9) Tackling chronic respiratory diseases across the life cycle**

Pre-natal and early-life events have a major impact on the development of chronic diseases in adults [64, 65] and older people, including diabetes [66], coronary heart diseases [67], asthma [68], COPD [3] or neurodegenerative diseases [69]. A better understanding of these links will make it possible to propose effective novel prevention strategies to promote active and healthy ageing.

The developmental origin of ageing is on the EU political agenda. The Polish Priority of the EU Council (2011) promoted the recognition, prevention and management of chronic respiratory diseases in children to ultimately affect healthy ageing [26]. The developmental determinants of non-communicable diseases in ageing were reinforced during the Cyprus Presidency of the EU Council (2012), which proposed to fight against non-communicable diseases across the life cycle [27]. A meeting at the European Parliament, organised by the Region Languedoc Roussillon and under the auspices of the Cyprus EU Priority (November 2012), was focussed on chronic respiratory diseases [28].

In order to find novel health promotion strategies in non-communicable diseases and to promote value creation, pre-natal and early life events were discussed in a meeting on December 2–3, 2013 by the Region Languedoc Roussillon and under the auspices of the frame of Action B3 of the EIP on AHA.

### **10) Multi-sectoral, multi-country initiative**

Members of each European country will be involved in a multi-sectoral approach: primary and secondary care, healthcare professionals (including pharmacists and nurses), social carers, patients and policy makers. Patients’ organisations and major European scientific societies are partners of the WHO Collaborating Centre for Asthma and Rhinitis for this initiative. EUREGHA will help to deploy AIRWAYS-ICPs in the EU regions. Partners outside the EU will also be involved in the initiative. Education and coaching for all stakeholders with patients’ organisations will be developed.

Interactions with the private sector have already been established with, as an example, Eurobiomed ([www.eurobiomed.org](http://www.eurobiomed.org); Commitment for Action B3 Action Plan), the focal point for the economic growth of MACVIA-LR (Contre les Maladies Chroniques pour un Vieillessement Actif; Fighting Chronic Diseases for Active and Healthy Ageing).

### **Added value**

AIRWAYS-ICPs is a demonstration project that follows the recommendations of the EU (Council Conclusions) [25, 26] and which may be the model for ICPs in other chronic diseases for Action Plan B3 of the EIP on AHA.

The project does not duplicate actions that can be taken at the country level, but rather highlights problems that are not sufficiently addressed, and facilitates or enables rectification of these needs. As an example, fewer than 10 EU countries have a national asthma plan under the auspices of the Ministry of Health. Moreover, in many European regions, although healthcare is delivered by regions, the existence of regional plans is scarce.

AIRWAYS-ICPs will be built using the solutions for chronic respiratory diseases that already exist in countries or regions, as well as with the expertise of health professionals across Europe and beyond. The solutions that have been validated by professionals or that have already evidenced their success will be promoted in order to reduce fragmentation.

This project responds to the 3053rd EU Council conclusions: “innovative approaches for chronic diseases in public health and healthcare systems” adopted on December 7, 2010 and to the United Nations High Level meeting (2011). Asthma and allergic diseases are common chronic respiratory diseases and 200 million subjects are affected in Europe. Furthermore, the project uses ICT – innovative simulation tools. It focuses on the conclusions of the 3131st session of the EU Council (2011) on the Prevention and Control of CRDs in Children. Asthma plans are particularly effective in underserved populations and attempts will be undertaken to reduce health inequities.

The project will help to achieve the objective of an active ageing, and responds to the 3206th Council Conclusions [27] that recommend the initiation of early diagnosis and treatment of chronic diseases as early as possible in order to improve active and healthy ageing.

The aim of AIRWAYS-ICPs is to improve healthy life years and to reduce burden (emergency visits, avoidable hospitalisations, disability and costs) while improving quality of life worldwide, and, in the longer term, to reduce disease incidence by new and innovative prevention strategies.

AIRWAYS-ICPs has a clear strategic relevance with regard to the EU Health Strategy as it will bring added value to the existing public health knowledge:

- To propose a common framework for chronic respiratory disease (and for comorbidities) ICPs for the entire EU which can then be expanded to other regions (e.g. the Commonwealth of Independent States) and which will allow comparability and trans-national initiatives.
- To help risk stratification in chronic respiratory disease patients, using a common strategy.
- To develop cost-effective policies, in particular strengthening those on smoking and environment exposure.
- To have a significant implication on the health of citizens in the short term (reduction of morbidity, improvement of education in children and of work in adults) and in the long term (healthy ageing).
- To propose a common simulation tool for the entire EU in order to assist physicians in the segmentation of patients and in the choice of pathways.

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## References

- 1 Bousquet J, Khaltaev N. Global Surveillance, Prevention and Control of Chronic Respiratory Diseases. A Comprehensive Approach. Global Alliance against Chronic Respiratory Diseases. Geneva, World Health Organization Press, 2007.
- 2 Gibson GJ, Loddenkemper R, Sibille, *et al.*, eds. European Lung White Book. 2nd Edn. Sheffield, European Respiratory Society, 2013.

- 3 Svanes C, Sunyer J, Plana E, *et al.* Early life origins of chronic obstructive pulmonary disease. *Thorax* 2010; 65: 14–20.
- 4 Perret JL, Dharmage SC, Matheson MC, *et al.* The interplay between the effects of lifetime asthma, smoking, and atopy on fixed airflow obstruction in middle age. *Am J Respir Crit Care Med* 2013; 187: 42–48.
- 5 Qaseem A, Wilt TJ, Weinberger SE, *et al.* Diagnosis and management of stable chronic obstructive pulmonary disease: a clinical practice guideline update from the American College of Physicians, American College of Chest Physicians, American Thoracic Society, and European Respiratory Society. *Ann Intern Med* 2011; 155: 179–191.
- 6 Brozek JL, Bousquet J, Baena-Cagnani CE, *et al.* Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines: 2010 revision. *J Allergy Clin Immunol* 2010; 126: 466–476.
- 7 Guyatt GH, Oxman AD, Vist GE, *et al.* GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* 2008; 336: 924–926.
- 8 Brozek JL, Akl EA, Compalati E, *et al.* Grading quality of evidence and strength of recommendations in clinical practice guidelines part 3 of 3. The GRADE approach to developing recommendations. *Allergy* 2011; 66: 588–595.
- 9 Bateman ED, Hurd SS, Barnes PJ, *et al.* Global strategy for asthma management and prevention: GINA executive summary. *Eur Respir J* 2008; 31: 143–178.
- 10 Vestbo J, Hurd SS, Agustí AG, *et al.* Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease: GOLD Executive Summary. *Am J Respir Crit Care Med* 2013; 187: 347–365.
- 11 Gibson PG, Simpson JL. The overlap syndrome of asthma and COPD: what are its features and how important is it? *Thorax* 2009; 64: 728–735.
- 12 Pistelli R, Ferrara L, Misuraca C, *et al.* Practical management problems of stable chronic obstructive pulmonary disease in the elderly. *Curr Opin Pulm Med* 2011; 17: Suppl. 1, S43–S48.
- 13 Haahtela T, Tuomisto LE, Pietinalho A, *et al.* A 10 year asthma programme in Finland: major change for the better. *Thorax* 2006; 61: 663–670.
- 14 Kinnula VL, Vasankari T, Kontula E, *et al.* The 10-year COPD Programme in Finland: effects on quality of diagnosis, smoking, prevalence, hospital admissions and mortality. *Prim Care Respir J* 2011; 20: 178–183.
- 15 Souza-Machado C, Souza-Machado A, Franco R, *et al.* Rapid reduction in hospitalisations after an intervention to manage severe asthma. *Eur Respir J* 2010; 35: 515–521.
- 16 National Clinical Guideline Centre for Acute and Chronic Conditions. Chronic Obstructive Pulmonary Disease: Management of Chronic Obstructive Pulmonary Disease in Adults in Primary and Secondary Care (partial update). London, National Clinical Guideline Centre for Acute and Chronic Conditions, 2010. Available from: <http://guidance.nice.org.uk/CG101>
- 17 Long Alliantie Nederland. Zorgstandaard astma Volwassenen [Standards of Care for Asthma in Adults]. Amersfoort, Long Alliantie Nederland, 2012. Available from: [www.longalliantie.nl/files/6113/6752/1347/Zorgstandaard\\_Astma\\_Volwassenen.pdf](http://www.longalliantie.nl/files/6113/6752/1347/Zorgstandaard_Astma_Volwassenen.pdf)
- 18 Long Alliantie Nederland. Zorgstandaard astma Kinderen & Jongeren [Standards of Care for Asthma in Children and Young People]. Amersfoort, Long Alliantie Nederland, 2012. Available from: [www.longalliantie.nl/files/6513/6752/1347/Zorgstandaard\\_Astma\\_Kinderen\\_en\\_Jongeren.pdf](http://www.longalliantie.nl/files/6513/6752/1347/Zorgstandaard_Astma_Kinderen_en_Jongeren.pdf)
- 19 Long Alliantie Nederland. Zorgstandaard COPD [Standards of Care for COPD]. Amersfoort, Long Alliantie Nederland, 2013. Available from: [www.longalliantie.nl/files/5113/7994/2952/LAN\\_Zorgstandaard\\_COPD-2013-juni.pdf](http://www.longalliantie.nl/files/5113/7994/2952/LAN_Zorgstandaard_COPD-2013-juni.pdf)
- 20 National Institute for Health and Clinical Excellence. Asthma. Quality standards. <http://publications.nice.org.uk/quality-standard-for-asthma-qs25> February 2013. Date last accessed: January 12, 2014.
- 21 QOF Clinical Indicators 2013/14: Summary Tables. [www.eguidelines.co.uk/eguidelinesmain/external\\_guidelines/qof.php](http://www.eguidelines.co.uk/eguidelinesmain/external_guidelines/qof.php) April 2013. Date last accessed: January 12, 2014.
- 22 World Health Organization. Package of Essential NCD Interventions for Primary Health Care: Cancer, Diabetes, Heart Disease and Stroke, Chronic Respiratory Disease. Geneva, WHO Press, 2010.
- 23 Hamzaoui A, Ottmani S. Practical approach to lung health: lung health for everyone? *Eur Respir Rev* 2012; 21: 186–195.
- 24 English RG, Bateman ED, Zwarenstein MF, *et al.* Development of a South African integrated syndromic respiratory disease guideline for primary care. *Prim Care Respir J* 2008; 17: 156–163.
- 25 Samolinski B, Fronczak A, Włodarczyk A, *et al.* Council of the European Union conclusions on chronic respiratory diseases in children. *Lancet* 2012; 379: e45–e46.
- 26 Samolinski B, Fronczak A, Kuna P, *et al.* Prevention and control of childhood asthma and allergy in the EU from the public health point of view: Polish Presidency of the European Union. *Allergy* 2012; 67: 726–731.
- 27 Council Conclusions on Healthy Ageing Across the Lifecycle. 3206th Employment, Social Policy, Health and Consumer Affairs Council Meeting. Brussels, 7 December 2012. [http://www.consilium.europa.eu/uedocs/cms\\_data/docs/pressdata/en/lsa/134097.pdf](http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/lsa/134097.pdf) December 2012. Date last accessed: January 12, 2014.
- 28 Bousquet J, Tanasescu C, Camuzat T, *et al.* Impact of early diagnosis and control of chronic respiratory diseases on active and healthy ageing. A debate at the European Union Parliament. *Allergy* 2013; 68: 555–561.
- 29 Bousquet J, Anto JM, Sterk PJ, *et al.* Systems medicine and integrated care to combat chronic noncommunicable diseases. *Genome Med* 2011; 3: 43.
- 30 Yanbaeva DG, Dentener MA, Creutzberg EC, *et al.* Systemic effects of smoking. *Chest* 2007; 131: 1557–1566.
- 31 Petersen AM, Pedersen BK. The anti-inflammatory effect of exercise. *J Appl Physiol* 2005; 98: 1154–1162.
- 32 European Union/Innovation Union. Consultation on the Pilot European Innovation Partnership on Active and Healthy Ageing. [http://ec.europa.eu/research/innovation-union/index\\_en.cfm?section=active-healthy-ageing](http://ec.europa.eu/research/innovation-union/index_en.cfm?section=active-healthy-ageing) January 2014. Date last accessed: January 12, 2014.
- 33 Campbell H, Hotchkiss R, Bradshaw N, *et al.* Integrated care pathways. *BMJ* 1998; 316: 133–137.
- 34 Overill S. A practical guide to care pathways. *J Integr Care* 1998; 2: 93–98.
- 35 Great Ormond Street Hospital for Children NHS Trust. How to Produce and Evaluate an Integrated Care Pathway (ICP): Information for Staff. London, Great Ormond Street Hospital for Children NHS Trust, 2010. Available from: [www.gosh.nhs.uk/health-professionals/integrated-care-pathways/](http://www.gosh.nhs.uk/health-professionals/integrated-care-pathways/)
- 36 Integrated Care Pathways Users in Scotland (ICPUS). A Workbook for People Starting to Develop Integrated Care Pathways. ICPUS, 2007. Available from: [www.icpus.org.uk/wp-content/uploads/2007/08/icpus\\_workbook\\_2007.pdf](http://www.icpus.org.uk/wp-content/uploads/2007/08/icpus_workbook_2007.pdf)

- 37 Campbell SM, Reeves D, Kontopantelis E, *et al.* Effects of pay for performance on the quality of primary care in England. *N Engl J Med* 2009; 361: 368–378.
- 38 Kirschner K, Braspenning J, Akkermans RP, *et al.* Assessment of a pay-for-performance program in primary care designed by target users. *Fam Pract* 2013; 30: 161–171.
- 39 Rodriguez HP, Perry L, Conrad DA, *et al.* The reliability of medical group performance measurement in a single insurer's pay for performance program. *Med Care* 2012; 50: 117–123.
- 40 Pinnock H, Burton C, Campbell S, *et al.* Clinical implications of the Royal College of Physicians three questions in routine asthma care: a real-life validation study. *Prim Care Respir J* 2012; 21: 288–294.
- 41 Ouwens M, Hulscher M, Hermens R, *et al.* Implementation of integrated care for patients with cancer: a systematic review of interventions and effects. *Int J Qual Health Care* 2009; 21: 137–144.
- 42 Chan R, Webster J. End-of-life care pathways for improving outcomes in caring for the dying. *Cochrane Database Syst Rev* 2010; CD008006.
- 43 Doods S. Designing improved health care processes using discrete event stimulation. *Br J Healthcare Comput Inf Manag* 2005; 22: 14–16.
- 44 O'Connor J, Seeto C, Saini B, *et al.* Healthcare professional *versus* patient goal setting in intermittent allergic rhinitis. *Patient Educ Couns* 2008; 70: 111–117.
- 45 Lisspers K, Odeback P. Riktlinjer for allergisk rinit och astma maste na ut. Primarvarden och de lokala apoteken behover samarbete mer [Guidelines for allergic rhinitis and asthma must reach out. Primary health care and the local pharmacies need to cooperate more]. *Lakartidningen* 2012; 109: 615.
- 46 Sullivan PW, Nair KV, Patel BV. The effect of the Rx-to-OTC switch of loratadine and changes in prescription drug benefits on utilization and cost of therapy. *Am J Manag Care* 2005; 11: 374–382.
- 47 European Innovation Partnership on Active and Healthy Ageing. The Specific Actions and How to Engage in their Implementation. [http://ec.europa.eu/research/innovation-union/index\\_en.cfm?section=active-healthy-ageing](http://ec.europa.eu/research/innovation-union/index_en.cfm?section=active-healthy-ageing) March 6, 2012. Date last accessed: January 12, 2014.
- 48 World Health Organization Regional Office for Europe. Strategy and Action Plan for Healthy Ageing in Europe, 2012–2020. Copenhagen, World Health Organization Regional Office for Europe, 2012. Available from: [www.euro.who.int/\\_\\_data/assets/pdf\\_file/0008/175544/RC62wd10Rev1-Eng.pdf](http://www.euro.who.int/__data/assets/pdf_file/0008/175544/RC62wd10Rev1-Eng.pdf)
- 49 Bousquet J, Mantzouranis E, Cruz AA, *et al.* Uniform definition of asthma severity, control, and exacerbations: document presented for the World Health Organization Consultation on Severe Asthma. *J Allergy Clin Immunol* 2010; 126: 926–938.
- 50 Bousquet J, Anto JM, Demoly P, *et al.* Severe chronic allergic (and related) diseases: a uniform approach – a MeDALL–GA2LEN–ARIA position paper. *Int Arch Allergy Immunol* 2012; 158: 216–231.
- 51 Haahtela T, von Hertzen L, Makela M, *et al.* Finnish Allergy Programme 2008–2018 – time to act and change the course. *Allergy* 2008; 63: 634–645.
- 52 International Primary Care Respiratory Group. Mapping of National Guidelines used by Primary Care. [www.theipcr.org/display/ResMapping/Mapping+of+national+guidelines+used+by+primary+care](http://www.theipcr.org/display/ResMapping/Mapping+of+national+guidelines+used+by+primary+care) July 2013. Date last accessed: January 12, 2014.
- 53 Council of the European Union. Council Conclusions: Innovative Approaches for Chronic Diseases in Public Health and Healthcare Systems. 3053rd Employment, Social Policy Health and Consumer Affairs Council Meeting, Brussels, 7 December 2010. [www.consilium.europa.eu/uedocs/cms\\_data/docs/pressdata/en/lsa/118282.pdf](http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/lsa/118282.pdf) December 2010. Date last accessed: January 12, 2014.
- 54 Bousquet J, Clark TJ, Hurd S, *et al.* GINA guidelines on asthma and beyond. *Allergy* 2007; 62: 102–112.
- 55 Bel EH, Sousa A, Fleming L, *et al.* Diagnosis and definition of severe refractory asthma: an international consensus statement from the Innovative Medicine Initiative (IMI). *Thorax* 2011; 66: 910–917.
- 56 National Heart, Lung and Blood Institute. National Asthma Education and Prevention Program. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. Bethesda, US Department of Health and Human Services, 2007.
- 57 Hamrock E, Paige K, Parks J, *et al.* Discrete event simulation for healthcare organizations: a tool for decision making. *J Healthc Manag* 2013; 58: 110–124.
- 58 Bolton P, Power P. Better than a crystal ball? Using simulation to foresee emerging issues in the Australian Healthcare System. *World Hosp Health Serv* 2011; 47: 31–33.
- 59 Lee BY, Wong KF, Bartsch SM, *et al.* The Regional Healthcare Ecosystem Analyst (RHEA): a simulation modeling tool to assist infectious disease control in a health system. *J Am Med Inform Assoc* 2013; 20: e139–e146.
- 60 Murray RE, Ryan PB, Reisinger SJ. Design and validation of a data simulation model for longitudinal healthcare data. *AMIA Annu Symp Proc* 2011; 1176–1185.
- 61 Borycki EM, Kushniruk A, Keay E, *et al.* Toward an integrated simulation approach for predicting and preventing technology-induced errors in healthcare: implications for healthcare decision-makers. *Healthc Q* 2009; 12: 90–96.
- 62 Pidaparti RM, Koombua K. Simulation of the effect of airway disease on respiratory airways. *J Med Eng Technol* 2012; 36: 338–343.
- 63 Grimaldo F, Orduña JM, Lozano M, *et al.* Towards a simulator of integrated long-term care systems for elderly people. *Int J Artificial Intelligence Tools* 2014; 23: 1440005.
- 64 Barker DJ, Bull AR, Osmond C, *et al.* Fetal and placental size and risk of hypertension in adult life. *BMJ* 1990; 301: 259–262.
- 65 Krauss-Etschmann S, Bush A, Bellusci S, *et al.* Of flies, mice and men: a systematic approach to understanding the early life origins of chronic lung disease. *Thorax* 2013; 68: 380–384.
- 66 Simeoni U, Barker DJ. Offspring of diabetic pregnancy: long-term outcomes. *Sem Fetal Neonat Med* 2009; 14: 119–124.
- 67 Barker DJ. Coronary heart disease: a disorder of growth. *Horm Res* 2003; 59: Suppl. 1, 35–41.
- 68 Bousquet J, Jacot W, Yssel H, *et al.* Epigenetic inheritance of fetal genes in allergic asthma. *Allergy* 2004; 59: 138–147.
- 69 Landrigan PJ, Sonawane B, Butler RN, *et al.* Early environmental origins of neurodegenerative disease in later life. *Environ health Perspect* 2005; 113: 1230–1233.