



THE UNIVERSITY
of EDINBURGH

**Asthma UK Centre
for Applied Research**

A Learning Health System for Asthma

Dr Colin Simpson

Reader in Population Health Sciences



Queen Mary
University of London



University of
BRISTOL



education for health



Queen's University
Belfast



Swansea University
Prifysgol Abertawe



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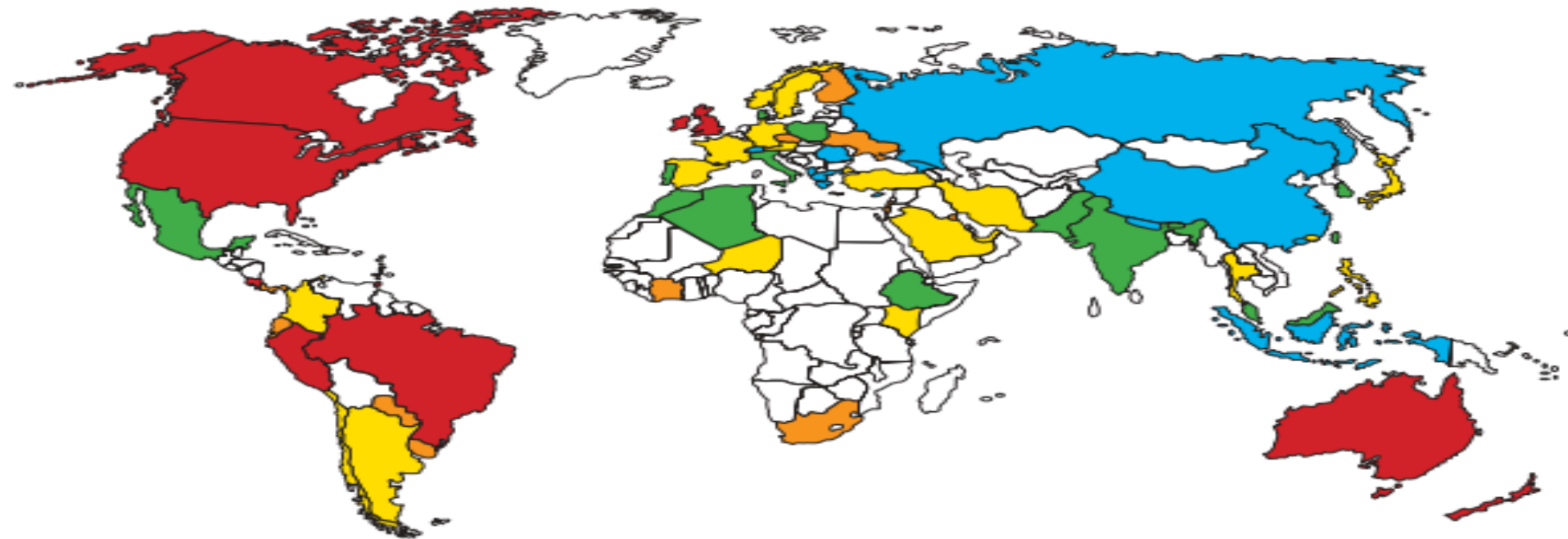
The University of Manchester



The University
Of Sheffield.

UEA
University of East Anglia

World Map of the Prevalence of Clinical Asthma



Proportion of population (%)*

	≥10.1
	7.6-10.0
	5.1-7.5

	2.5-5.0
	0-2.5
	No standardised data available

Scotland	18.4
Jersey	17.6
Guernsey	17.5
Wales	16.8
Isle of Man	16.7
England	15.3
New Zealand	15.1
Australia	14.7
Republic of Ireland	14.6
Canada	14.1
Peru	13.0
Trinidad & Tobago	12.6
Costa Rica	11.9
Brazil	11.4
United States of America	10.9
Fiji	10.5

Ivory Coast	7.8
Colombia	7.4
Turkey	7.4
Lebanon	7.2
Kenya	7.0
Germany	6.9
France	6.8
Norway	6.8
Japan	6.7
Sweden	6.5
Thailand	6.5
Hong Kong	6.2
Philippines	6.2
United Arab Emirates	6.2
Belgium	6.0
Austria	5.8

Oman	4.5
Pakistan	4.3
Tunisia	4.3
Cape Verde	4.2
Latvia	4.2
Poland	4.1
Algeria	3.9
South Korea	3.9
Bangladesh	3.8
Morocco	3.8
Occupied Territory of Palestine	3.6
Mexico	3.3
Ethiopia	3.1
Denmark	3.0
India	3.0

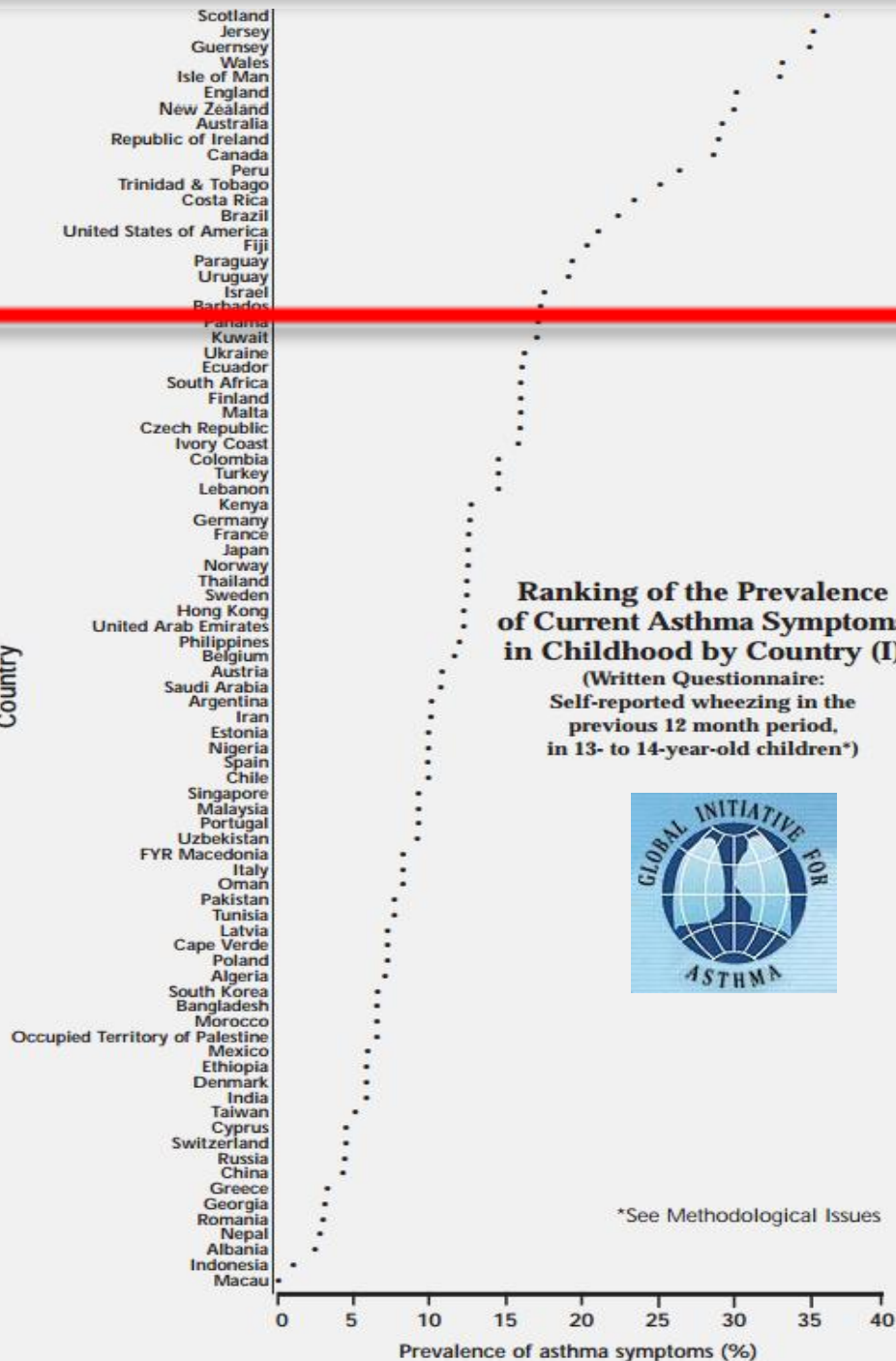
Ranking of the Prevalence of Current Asthma Symptoms in Childhood by Country (I)

(Written Questionnaire: Self-reported wheezing in the previous 12 month period, in 13- to 14-year-old children*)



*See Methodological Issues

Country



Ranking of the Prevalence of Current Asthma Symptoms in Adults by Country

(Written Questionnaire: Self-reported wheezing in the previous

12 month period, in 20- to 44-year-old adults*)

Country



*See Methodological Issues



Asthma UK Centre
for Applied Research



Asthma in Scotland

in 2011-12



1.3m

people experienced
symptoms indicative
of asthma over a lifetime*



734k

people were diagnosed
by a physician
over a lifetime*

0.4m

people diagnosed with
symptomatic asthma
by a physician
(reported by patients)*

0.5m

people diagnosed & treated
by a physician
(reported by patients)*

0.3m

people diagnosed & treated
by a physician
(reported by GPs)

505k

GP and Nurse Consultations

5k

Out of Hours Calls

8k

ambulance conveyances
(7k to hospital)

9k

A&E
attendance

8k

episodes of
hospital care

180

episodes of
intensive care



94 people lost their lives to asthma



At least **£93m** was spent treating asthma

Data from national health surveys, primary & secondary care databases
and administrative databases;
For year 2010-11*.



Source

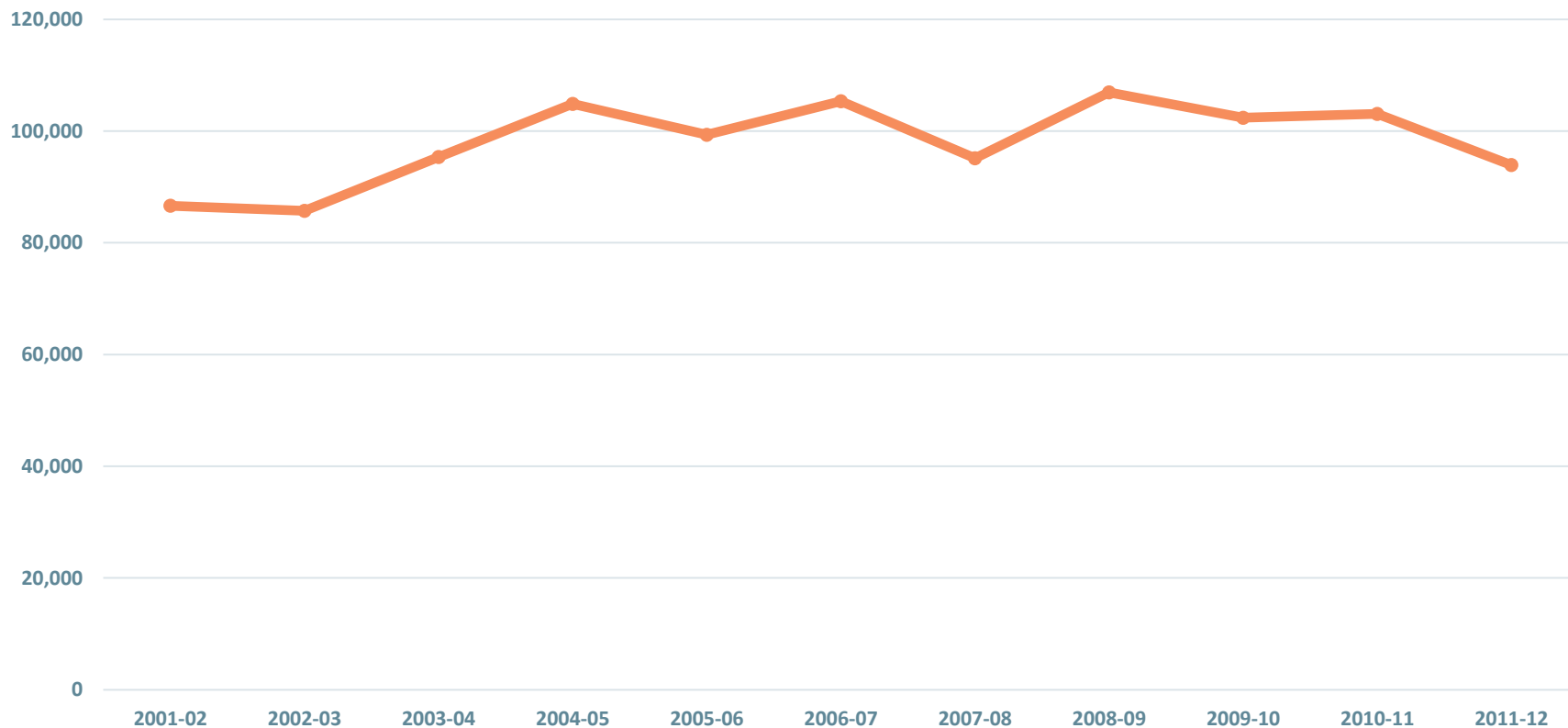
The epidemiology, healthcare and societal burden and costs of asthma in the UK and its member nations: analyses of
standalone and linked national databases; Mukherjee, M., et al; BMC Medicine, 14 (113), Aug 2016.
DOI: 10.1186/s12916-016-0657-8.



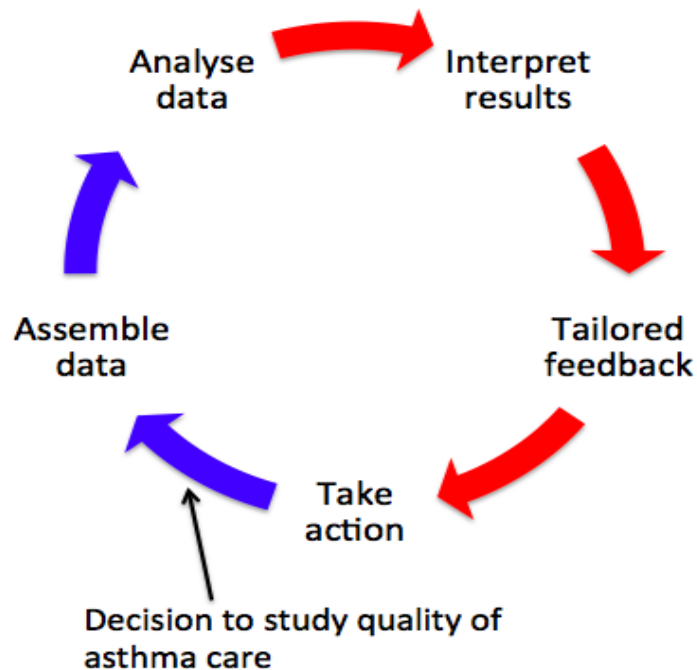
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**Asthma UK Centre
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Number of UK inpatient episodes with asthma as the primary diagnosis

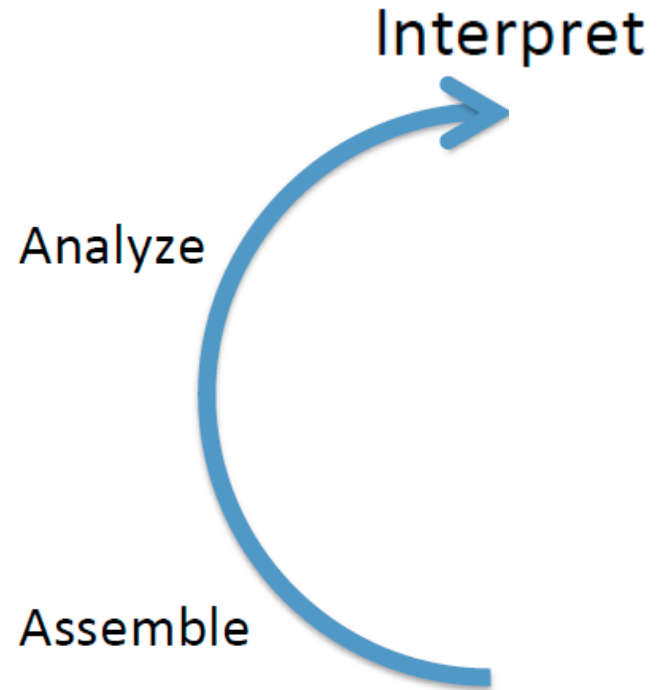


What is a Learning Health System?



Current situation

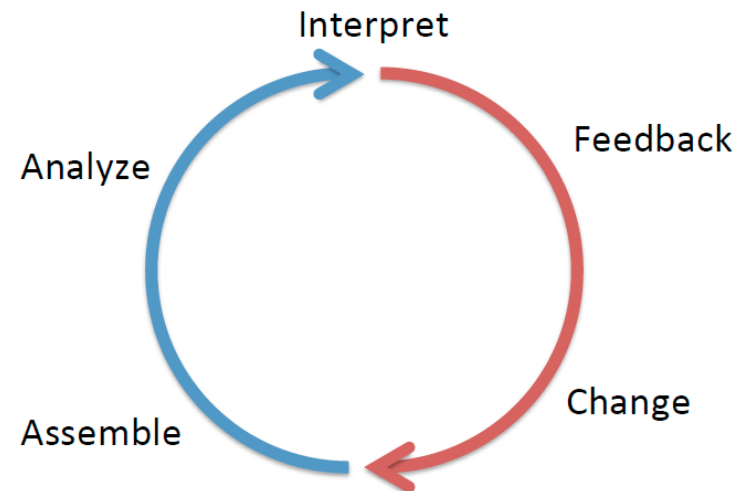
- Blue Afferent path:
 - Gathering and analysing data (big/large data)
- But.....
- High quality analytics – leading to national stats, high impact papers and emerging algorithms
- Difficult to judge direct impact on clinical practice



Where we want to get to:

- The Learning Health System completes the big data generation and analytics cycle
- Efferent (Red) side
 - Feeding back into the system what has been learned e.g. via decision support
 - Implementing change
 - Develop a continuously operating cycle of health improvement e.g. for people with asthma

Figure 1. The learning cycle, as described in "Toward Complete & Sustainable Learning Systems" by Professor Charles Friedman, available at http://medicine.umich.edu/sites/default/files/2014_12_08-Friedman-IOM%20LHS.pdf (accessed 24/02/2015)

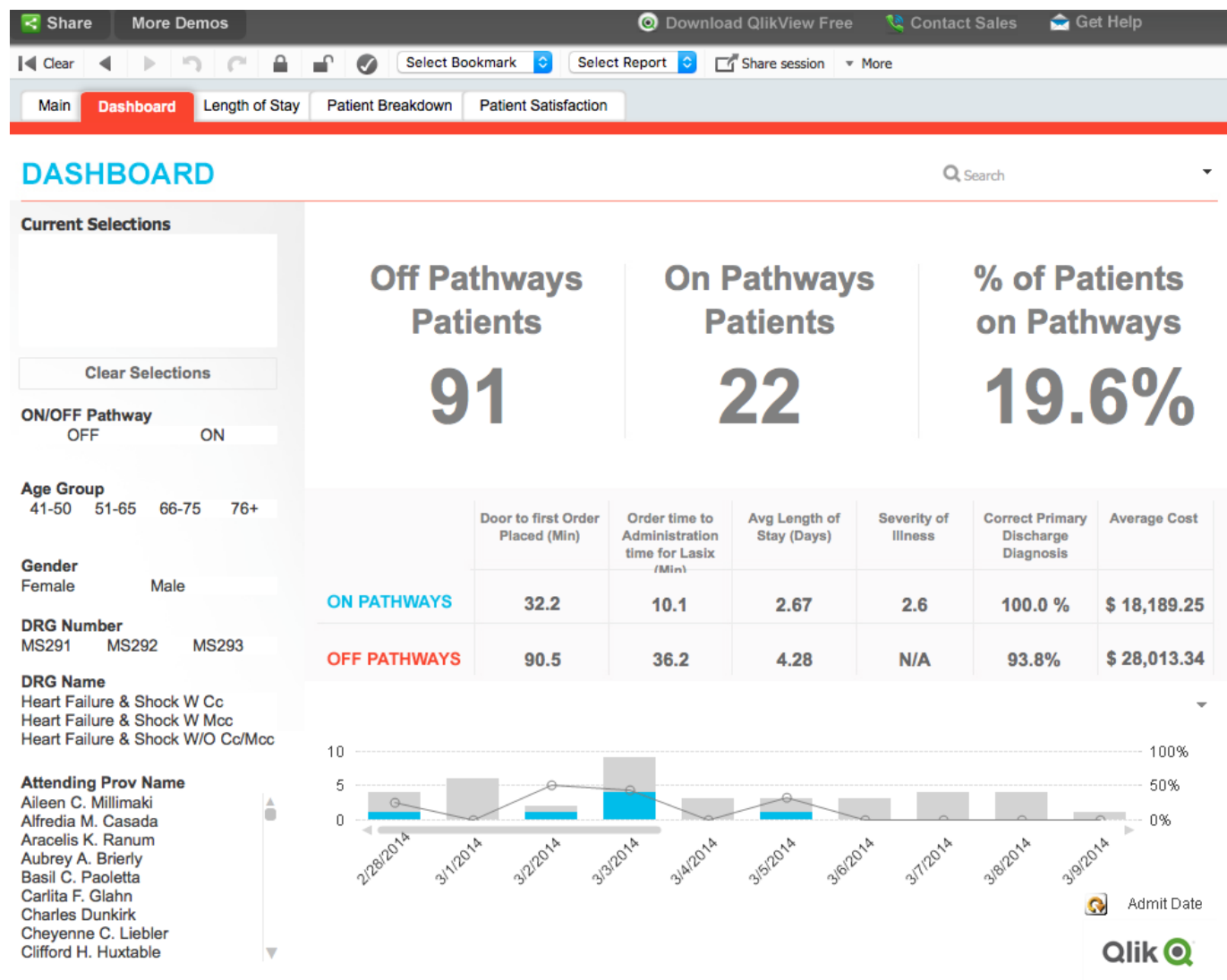


Our overall aims

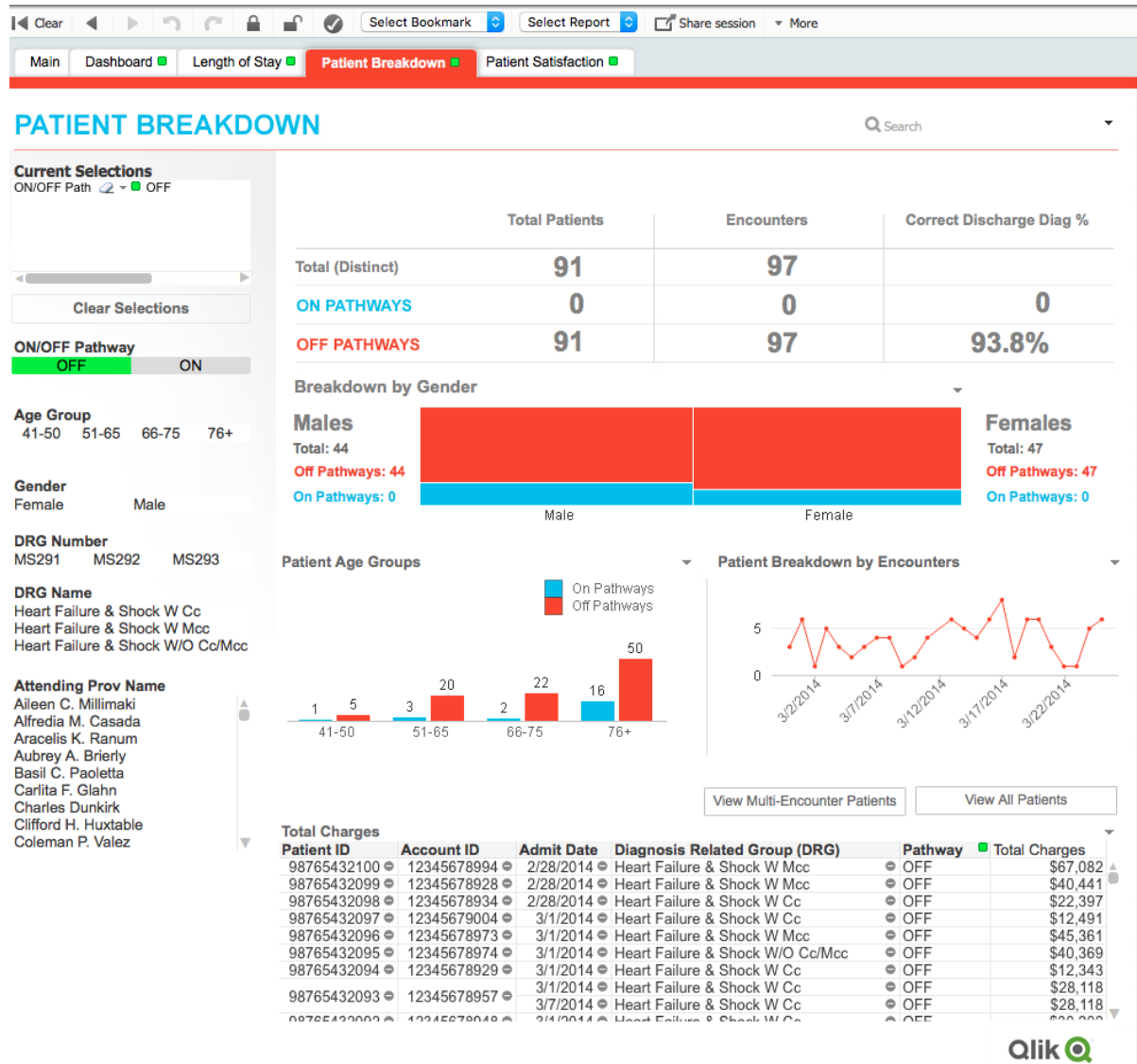
- Build a data feed that enables intelligent analytics to identify patients at-risk of asthma attack – decision support
- Create visualisation and management support tools
 - iteratively improved with input from general practices and their staff
- Promote positive action in the management of people with asthma via feedback at various levels
- Education (patient & clinician, behaviour etc.)



Visualisation Examples (diabetes)



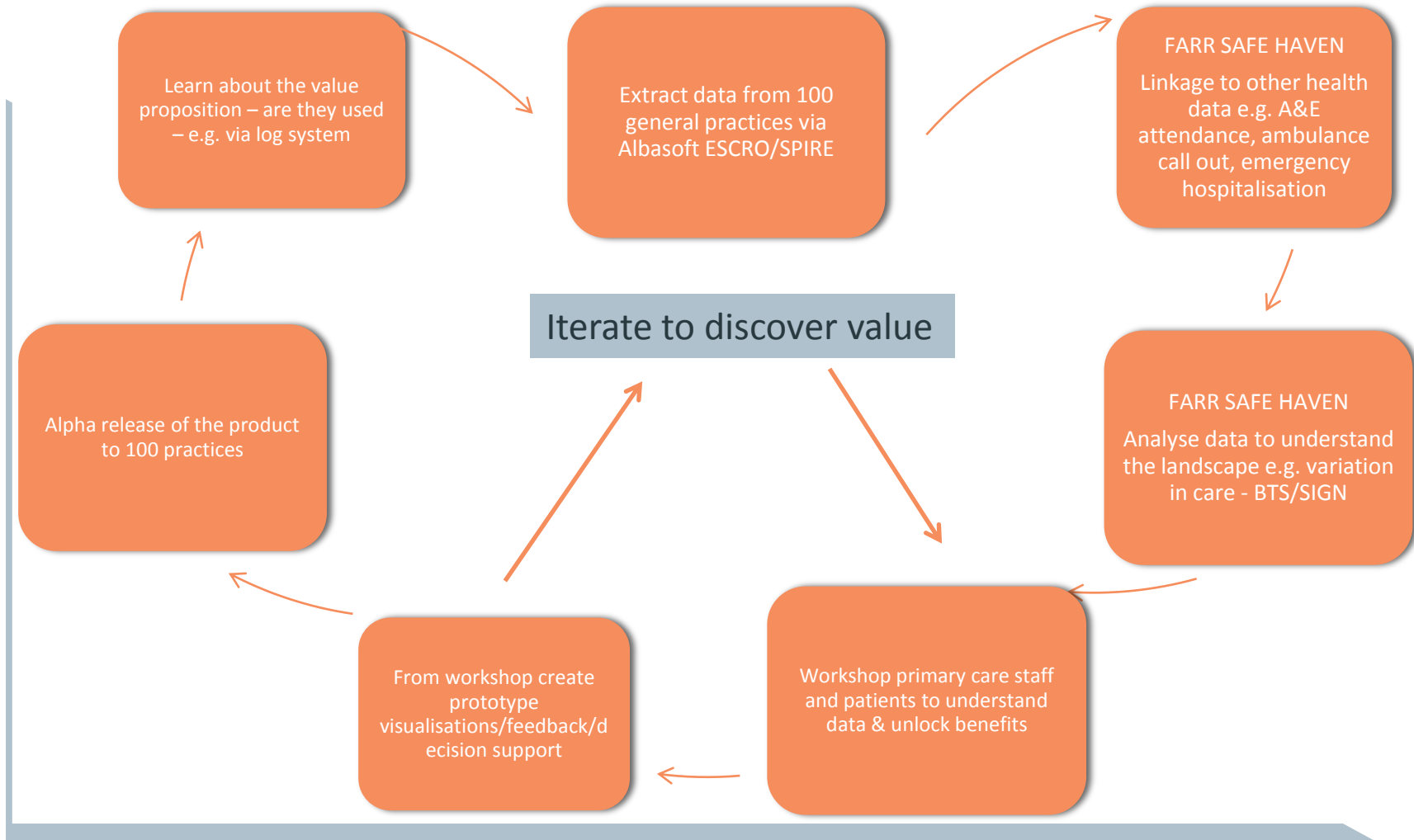
Visualisation Examples (diabetes)



Farr Institute funded prototype work

- Agree on data to be extracted and data integration approaches
- Secure ethics/governance permissions (September 2016)
- Recruit 100 practices – (October 2016) and establish data extraction procedures
- Create appropriate feedback using visualisation tools and establishing channels to feedback key -
- Create algorithms for identifying asthma attacks for decision support tool (and how this fits with workflow)
- Iterate via workshops

Initial Test Design (Farr Prototype)

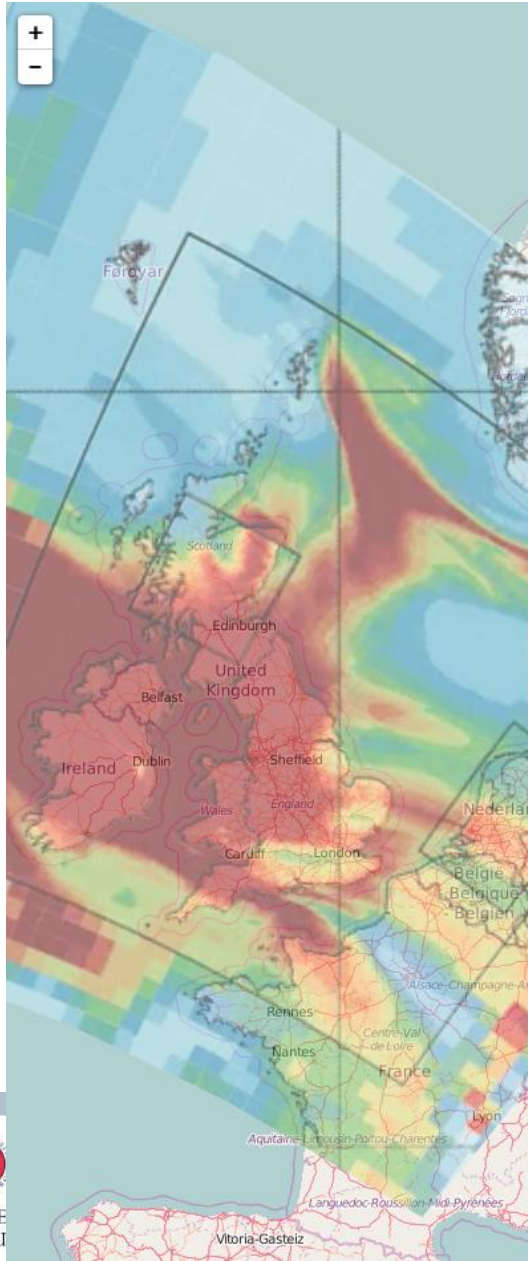


Atmospheric Pollutant Portal

EMEP4UK is an atmospheric-chemistry transport model that simulates the composition of pollutants in the UK's atmosphere through time. It uses the Weather Research Forecast (WRF) model as its main driver. It is used to underpin research and develop European policy through the UNECE Convention on Long-range Transboundary Air Pollution.

Ozone	Nitric oxide	Nitrogen dioxide	Ammonia	Nitric acid
Sulphur dioxide	Ammonium particles $\leq 2.5\mu\text{m}$	Sulphate particles $\leq 2.5\mu\text{m}$	Nitrate particles $\leq 10\mu\text{m}$	Particles $\leq 2.5\mu\text{m}$
Particles $\leq 10\mu\text{m}$	Particulate organic matter $\leq 2.5\mu\text{m}$			

The EMEP4UK model framework consists of an atmospheric chemistry transport model (ACTM) which simulates hourly to annual average atmospheric composition and deposition of various pollutants and the weather research and forecast model (WRF). Pollutants simulated include PM₁₀, PM_{2.5}, secondary organic aerosols (SOA), elemental carbon (EC), secondary inorganic aerosols (SIA), SO₂, NH₃, NO_x, and O₃. Dry and wet deposition of pollutants are also calculated by the model. WRF is used to calculate the required meteorological input data for the ACTM.



TIME

Never Offline.

The Apple Watch is just the start.
How wearable tech will change
your life—like it or not.

BY LEV GROSSMAN
AND MATT VELLA



Possible workshop questions

- Is the idea of a learning health system for asthma of interest to the practices – any initial thoughts?
- 100 practices recruited (£50 per practice) – interest?
- Workshops – what process easiest for practices? Costs?
- Correct data/variables to look at?
- Ease of use – website vs. vendor feedback
- Decision support tools that exist – good and bad points?





Further Details: Colin Simpson



@DrColinSimpson

