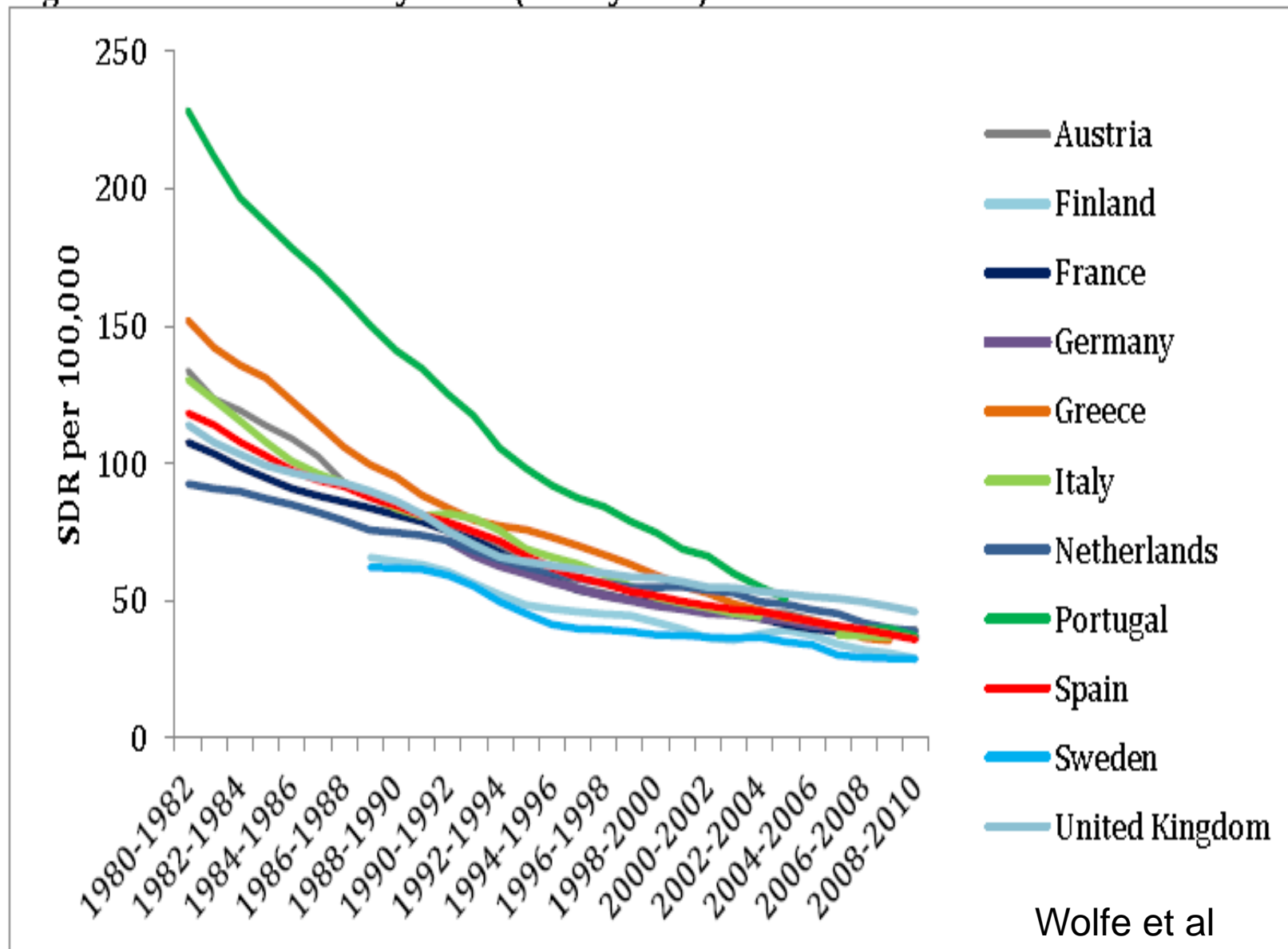


Evaluating child public health interventions



Prof Mitch Blair
River Island Academic Centre for Paediatrics and Child
Health
Northwick Park Hospital Campus
Harrow

Fig. 1 Trends in mortality rates (0-14 years)



Source: (World Health Organization 2012)

Wolfe et al
LANCET 2013

Table 1:

Mortality (all-cause, DSR, 0-14, 5-year average*) and excess deaths (absolute no., per year)

Row Labels	DSR	Excess deaths, compared to Sweden
Sweden	29.27	0
Luxembourg	26.50	0
Finland	30.27	9
Spain	37.40	545
Greece	37.86	135
Germany	37.88	815
Italy	38.07	683
France	38.25	962
Austria	39.09	106
Ireland	39.78	98
Netherlands	40.66	292
Portugal	40.73	176
Denmark	42.69	121
United Kingdom	47.73	1951
Belgium	47.77	304
total EU15		6198

* average for 2006-2010 for all except: France, Luxembourg 2005-2009; Denmark 2002-2006; Belgium 1998-1999 and 2004-2006; Italy 2003 and 2006-2009; Portugal 2003 and 2007-2010

DSR= directly standardised rate

Wolfe et al LANCET 2013

Source: World Health Organization 2012

Excess deaths in childhood

1,951 per year

5 children a
day



Untrained GPs blamed for 2,000 child deaths

By JEREMY LAURANCE
Health Editor

Almost 2,000 British children a year die from "avoidable" causes because family doctors lack training in paediatric care, researchers warned yesterday.

Describing the situation as a "national scandal", the researchers said the UK was at the bottom of a European league, with the highest number of excess child deaths among 15 member states of the European Union. The UK child mortality rate is

more than 60 per cent higher than that of the best performer, Sweden, which sets the benchmark for excess deaths. In Sweden, fewer than 90 children in every 100,000 die, compared with more than 47 per 100,000 in the UK.

The researchers blamed Britain's health system, saying it had not adapted to meet children's needs. The UK has one of the highest child death rates from pneumonia, twice as high as Sweden's and three times those of France and Austria, even though the condition can be treated with antibiotics. In place of infectious diseases that were dominant a generation ago,

COMMON COMPLAINTS CHILD ILLNESSES THAT CAN KILL



Pneumonia is the most common serious childhood bacterial infection. Symptoms include difficulty breathing, rapid heart beat and fever. It can be difficult to diagnose because the symptoms are similar to those of the common cold, bronchitis and asthma. In severe cases it needs treatment in hospital with antibiotics and oxygen to help breathing.

Asthma affects over a million children in the UK but its incidence varies widely among countries. Symptoms include wheezing, coughing, chest tightness and shortness of breath. Usually the condition can be managed at home but an asthma attack may be life threatening. Research shows two-thirds of hospital admissions for asthma can be avoided.

in rising suicide rates and mental health problems in affected countries.

Death rates among children have been cut dramatically throughout Europe over the past three decades as a result of better housing and nutrition, improved healthcare and stronger public health measures such as smoking bans. But Dr Wolfe said health services were not keeping pace with changes in children's health needs. "Arguably, we should not be allowing children to die from pneumonia in countries with high-functioning health systems," she said.

On asthma, the UK has the highest death rate and the highest prevalence of the condition out of eight European countries. Sweden has the lowest death rate and average prevalence.

"This is a preventable cause of death," Dr Wolfe said. "If anything, [asthma] being commoner in the UK means we should be better at preventing deaths from it."

Most illnesses among children is minor and the biggest challenge for doctors is to distinguish potentially serious cases from trivial ones. That depends on the skill of the "gatekeepers to care" - or the UK's general practitioners.

Dr Wolfe said British GPs lacked training in paediatrics and did not work as closely with child specialists as their colleagues in Sweden do.

today's children are more likely to face such chronic problems as asthma, diabetes or behavioural difficulties.

Ingrid Wolfe, programme director for the Evelina London Children's Hospital at Guy's and St Thomas's NHS Foundation Trust, who led the

study, said: "Five more children a day die in Britain compared with Sweden. I think that is a national scandal and we don't make enough of it."

"Two thousand families lose a child each year - arguably avoidably." The study is part of a series on the state of

health in Europe, published in the medical journal *The Lancet*.

It charts the widening gap in life expectancy between Eastern and Western Europe, which is greater now than it was 40 years ago, and the impact of the current financial crisis seen

I write regarding your recent article in *The Lancet* ('Health services for children in western Europe') and wanted to pass on some concerns this has raised.

Whilst we agree that it is a worrying situation that, as was highlighted in your article, non-communicable diseases are increasingly the cause of childhood illness and death, we disagree with the assessment of the causes of this in the UK as reported in *The Independent*.

I would be happy to discuss these issues with you in more detail.

Yours sincerely

Laurence Buckman
Chairman, General Practitioners Committee

Independent
March 27, 2013

Why children die: death in infants, children and young people in the UK Part A

May 2014

A REPORT BY:

INGRID WOLFE
ALISON MACFARLANE
ANGELA DONKIN
MICHAEL MARMOT
RUSSELL VINER

ON BEHALF OF:

ROYAL COLLEGE OF PAEDIATRICS AND CHILD HEALTH
NATIONAL CHILDREN'S BUREAU
BRITISH ASSOCIATION FOR CHILD AND ADOLESCENT PUBLIC HEALTH

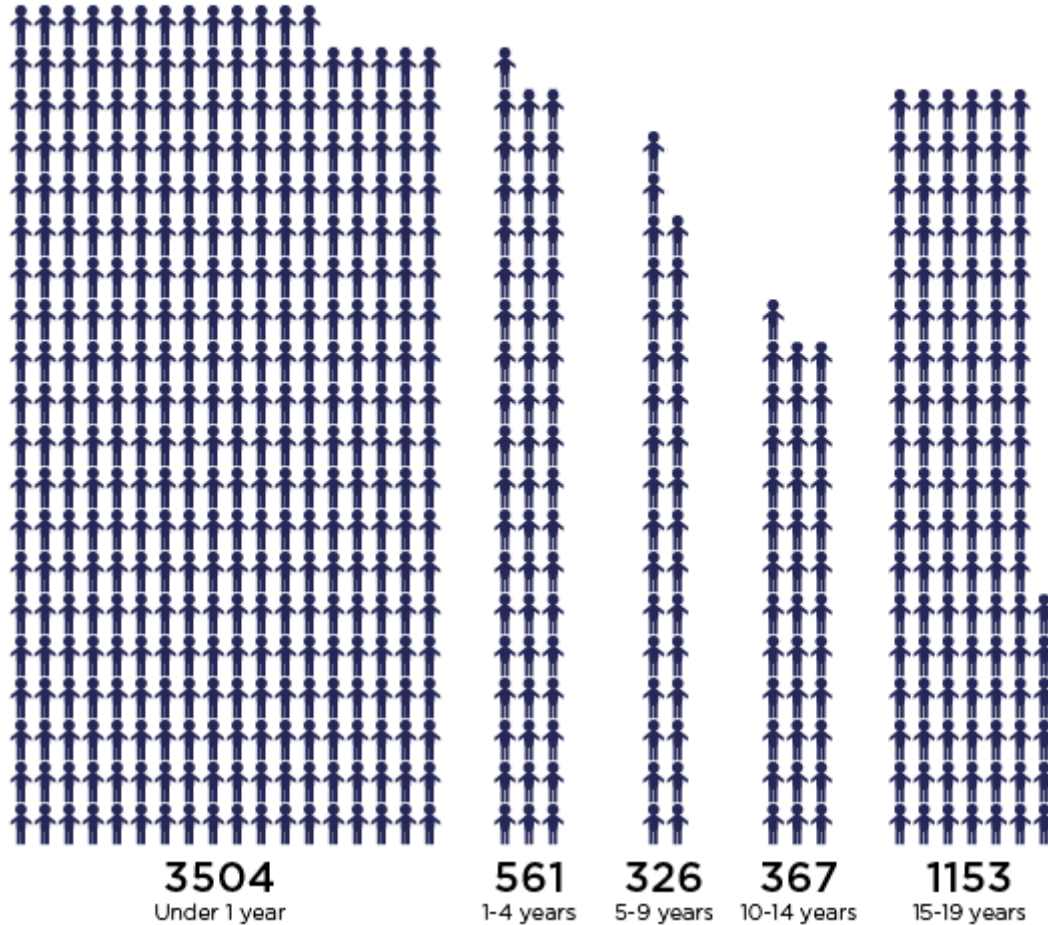


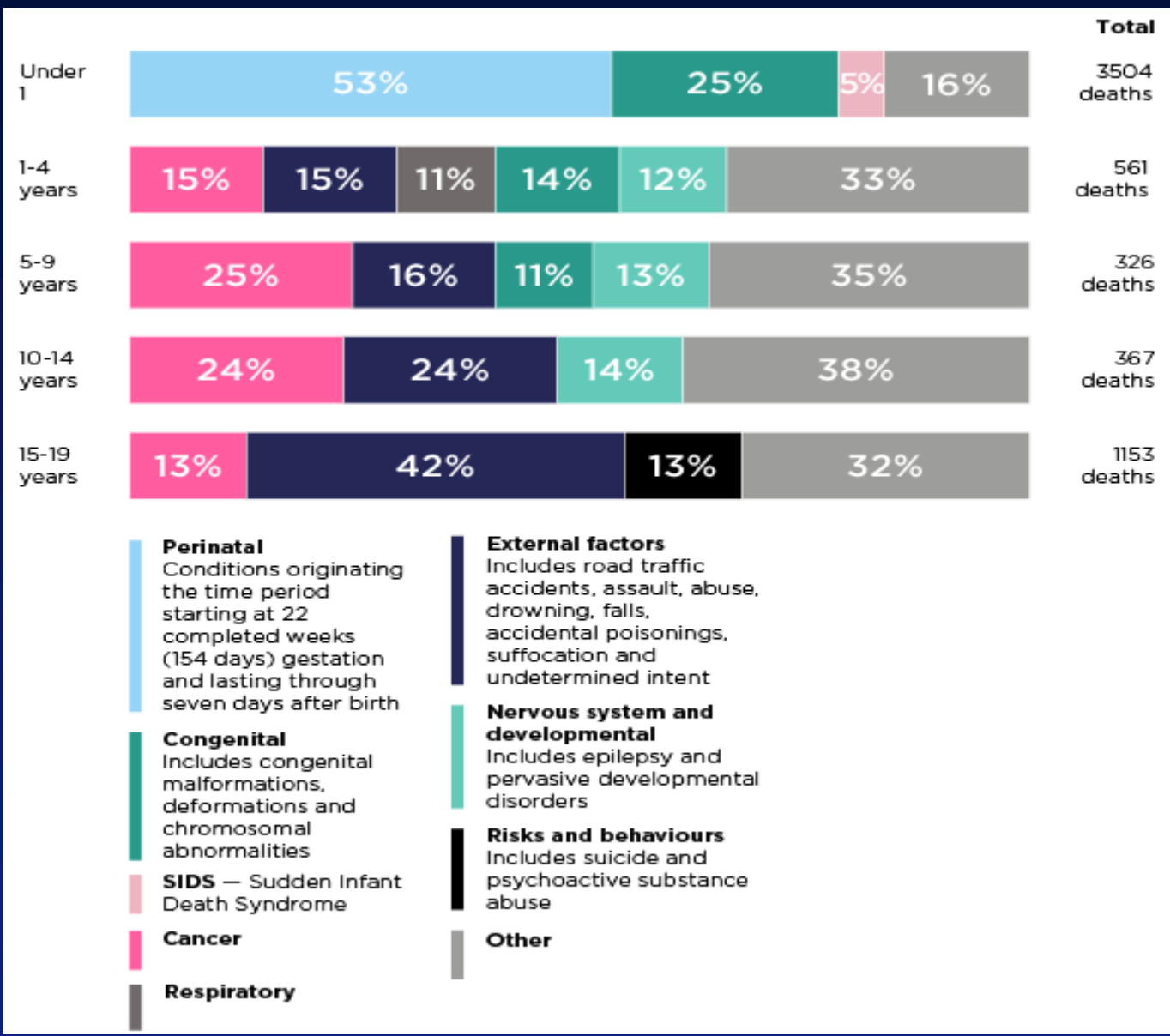
RCPCH

Royal College of
Paediatrics and Child Health
Leading the way in Children's Health

Childhood death in the UK

5911 Deaths





Asthma mortality in UK HIGH

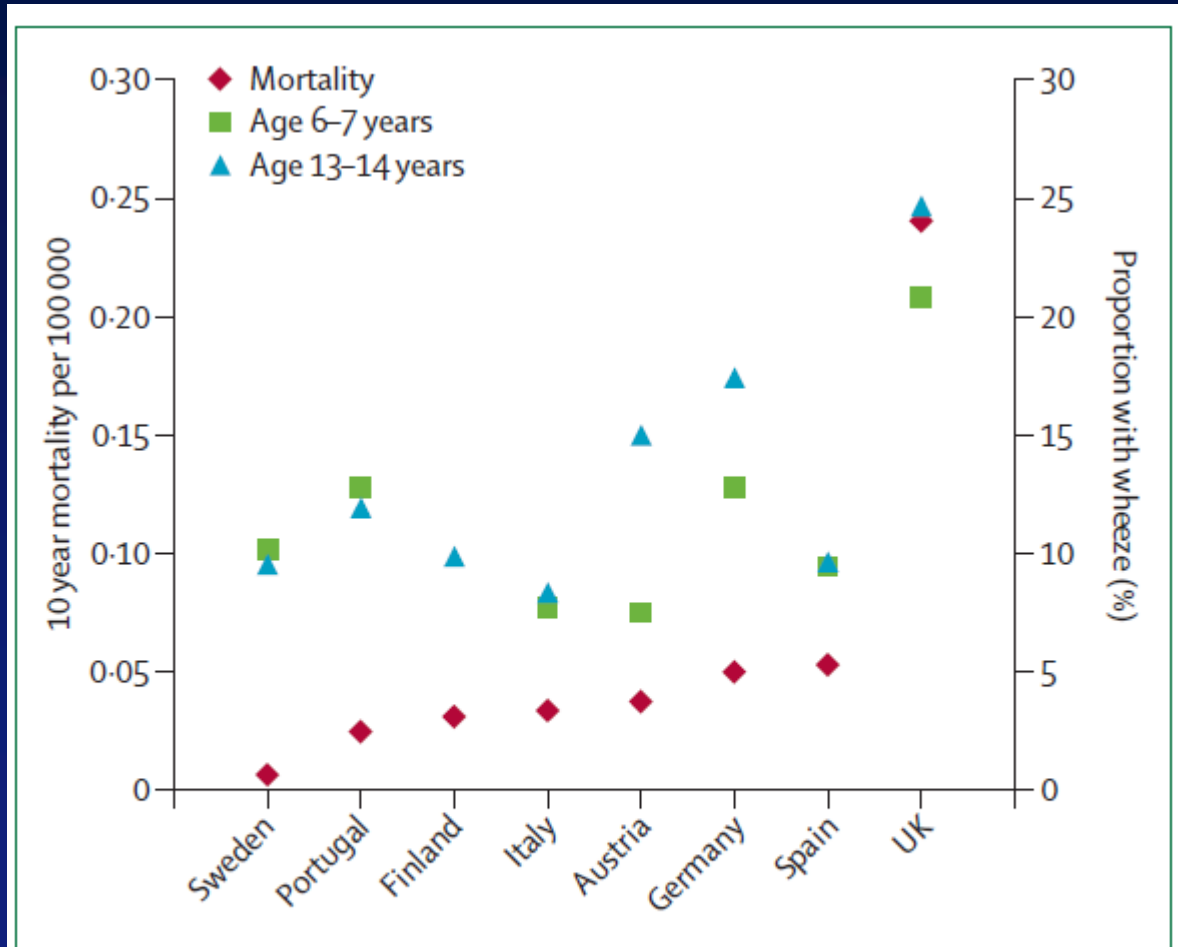
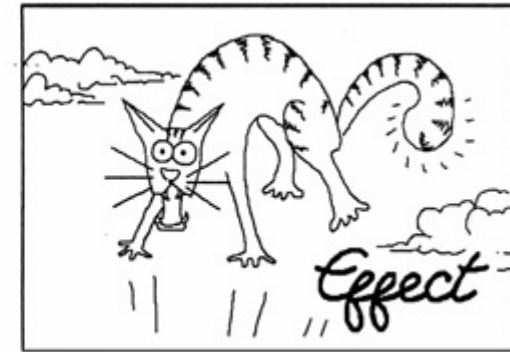
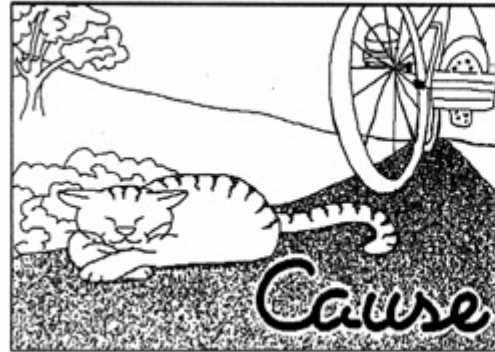
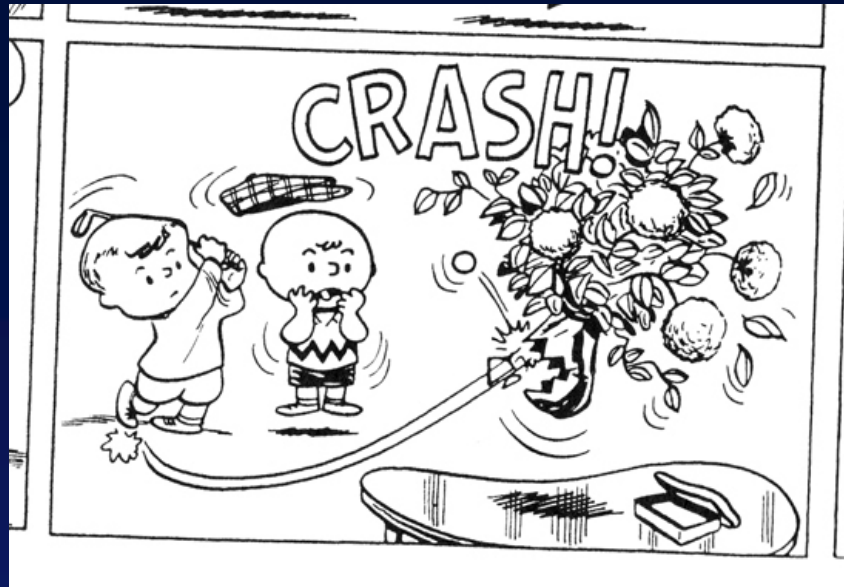


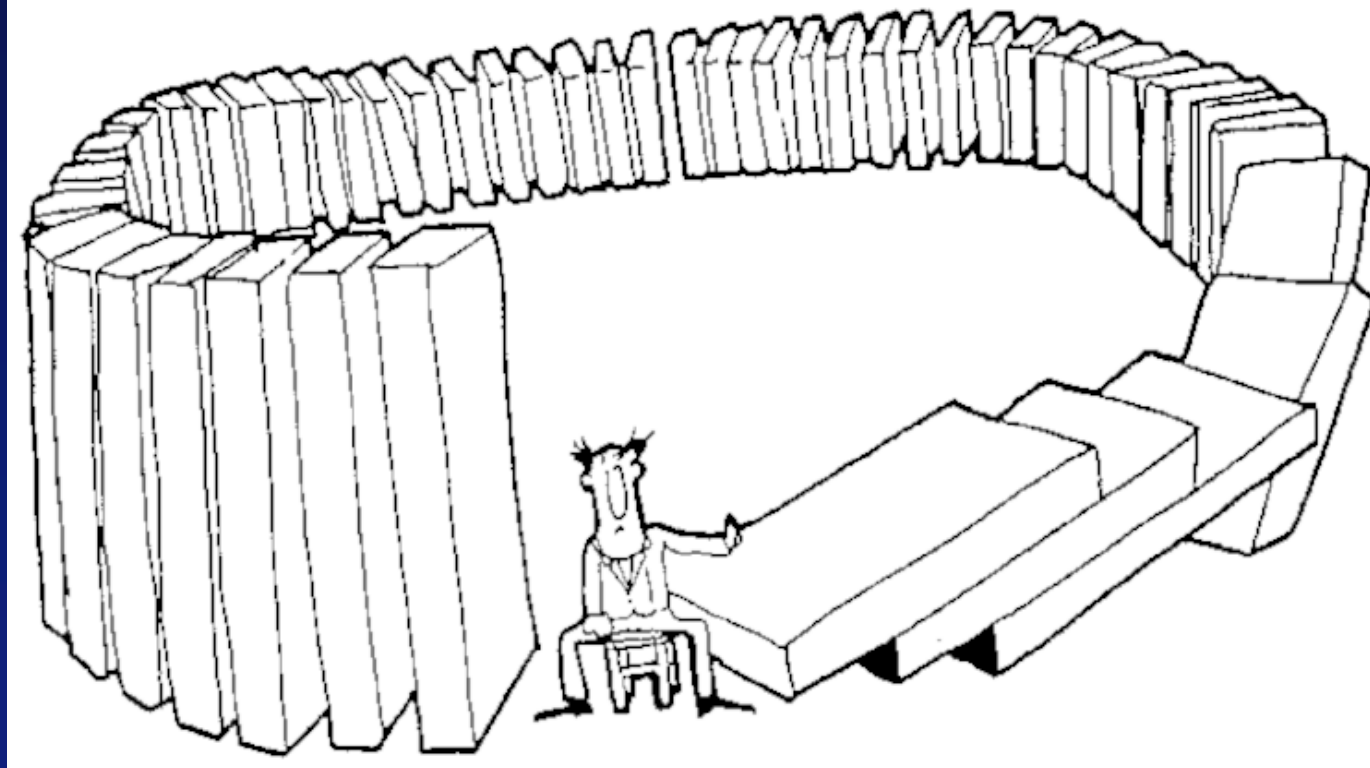
Figure 5: Asthma mortality rate in children aged 0-14 years, and proportion aged 6-7 and 13-14 years with wheeze, in eight western European countries

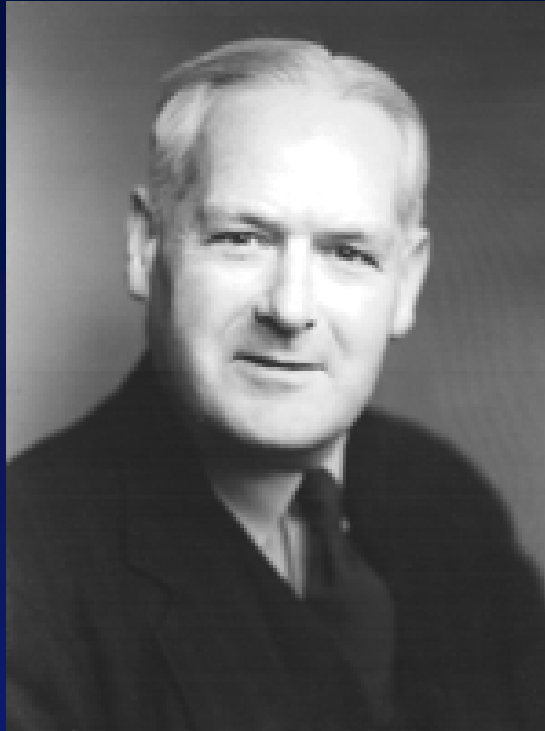
Cause??



Cause??

In complex systems, cause and effect are often distant in time and space





Austin Bradford Hill 1897-1991

Epidemiologist - occupational health specialist

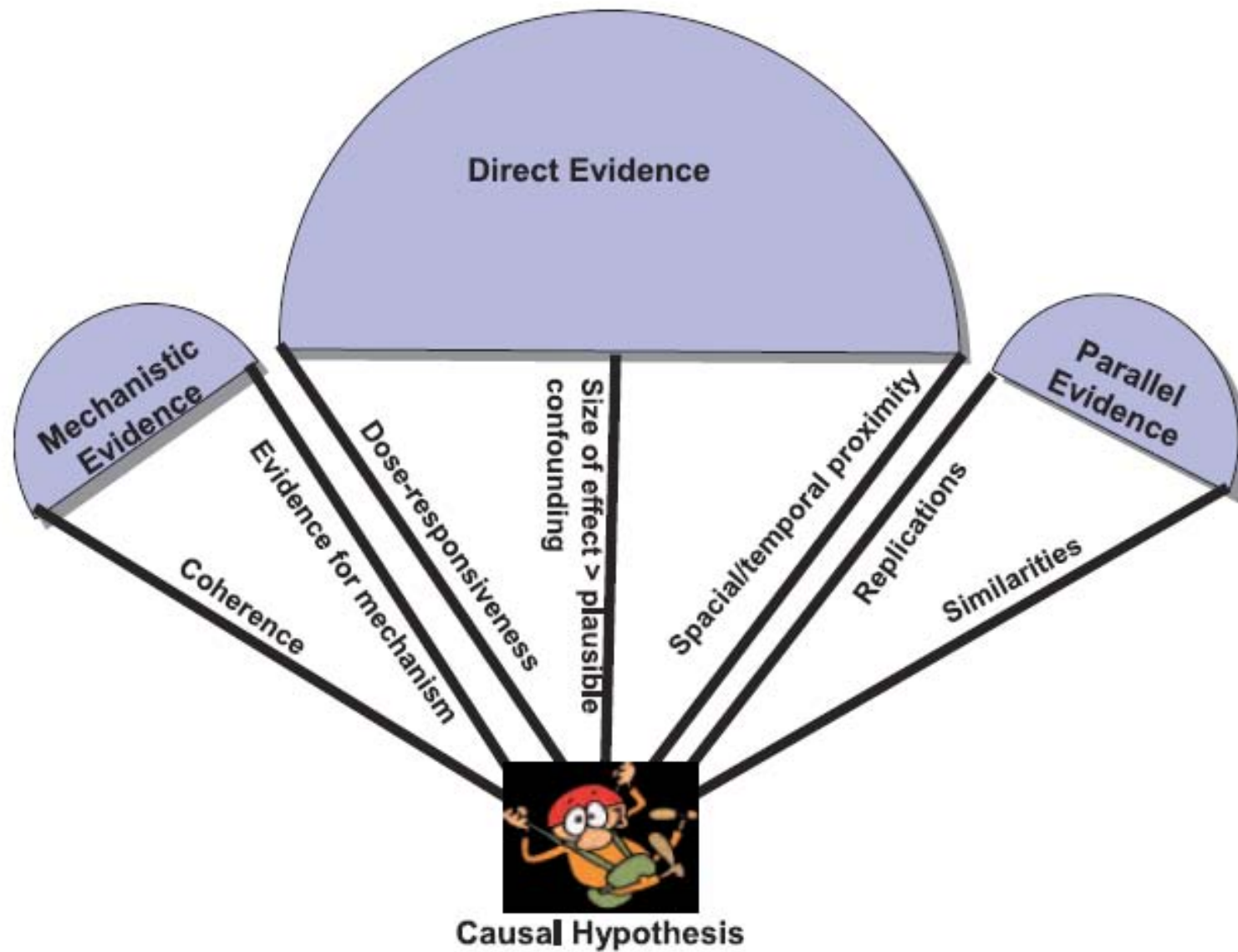
Criteria for causality

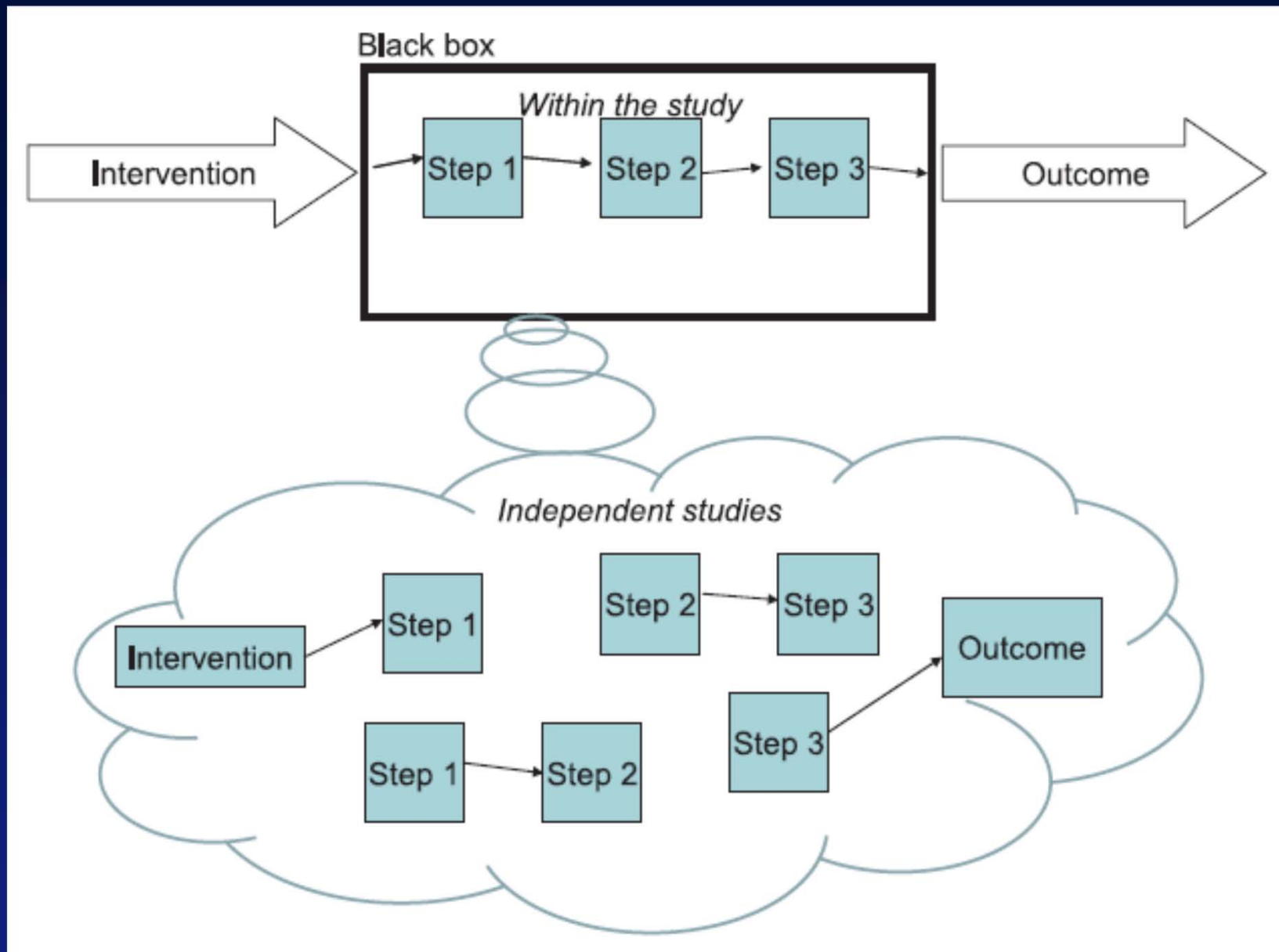
Smoking as example.....

- 1) *Strength of association.* The lung cancer rate for smokers was quite a bit higher than for nonsmokers (e.g., one study estimated that smokers are about 35% more likely than nonsmokers to get lung cancer).
- 2) *Temporality.* Smoking in the vast majority of cases preceded the onset of lung cancer.
- 3) *Consistency.* Different methods (e.g., prospective and retrospective studies) produced the same result. The relationship also appeared for different kinds of people (e.g., males and females).
- 4) *Theoretical plausibility.* Biological theory of smoking causing tissue damage which, over time, results in cancer in the cells was a highly plausible explanation.
- 5) *Coherence.* The conclusion (that smoking causes lung cancer) 'made sense' given the current knowledge about the biology and history of the disease.

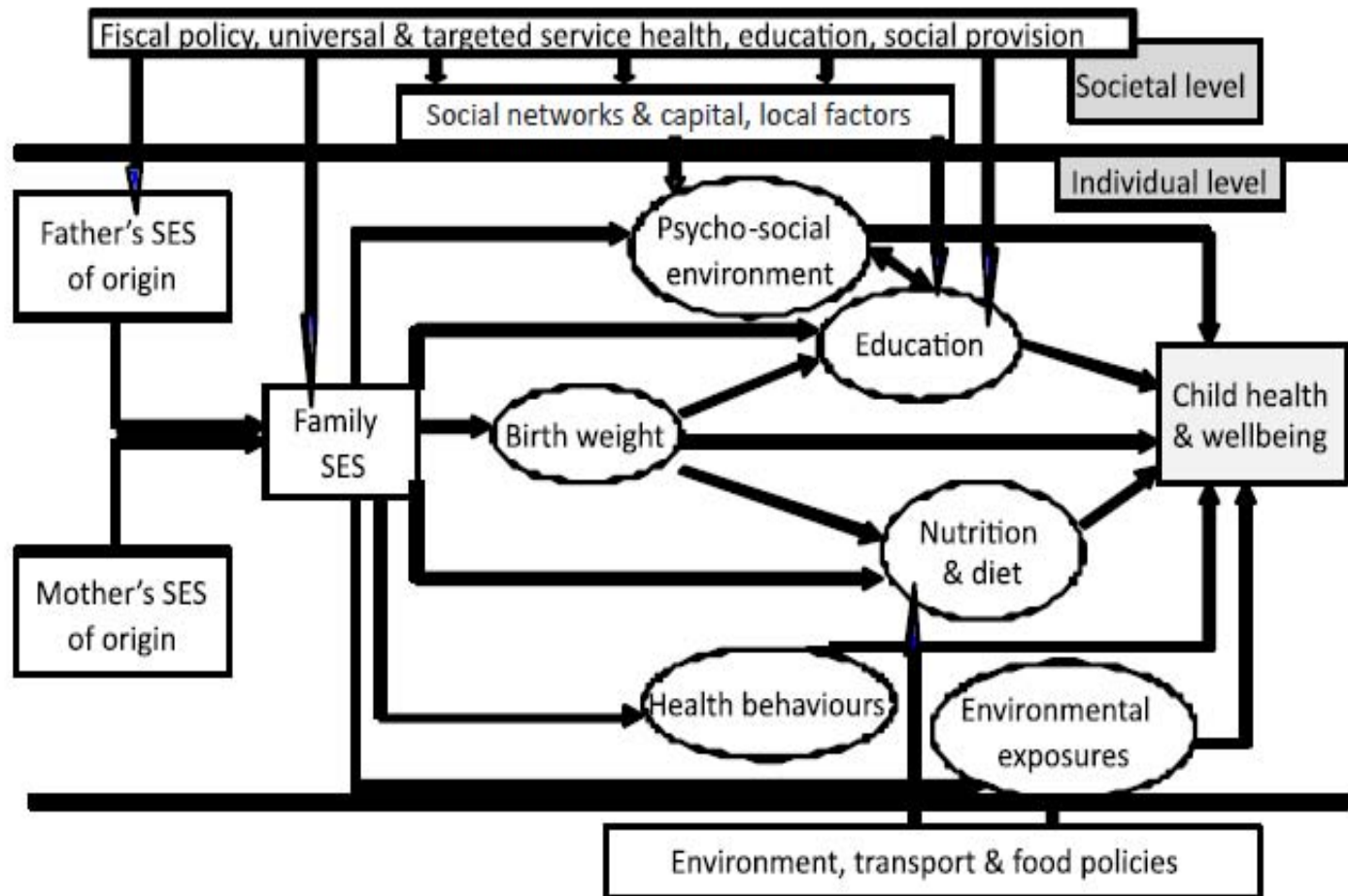
- 6) *Specificity in the causes.* Lung cancer is best predicted from the incidence of smoking.
- 7) *Dose-response relationship.* Data showed a positive, linear relationship between the amount smoked and the incidence of lung cancer.
- 8) *Experimental Evidence.* Tar painted on laboratory rabbits' ears was shown to produce cancer in the ear tissue over time. Hence, it was clear that carcinogens were present in tobacco tar.
- 9) *Analogy.* Smoking induced in laboratory rats showed a causal relationship. It, therefore, was not a great jump for scientists to apply this to humans. (Frumkin 2006, 2)

How different types of evidence support the causal hypothesis





Mapping societal level influences on individual level life course trajectory



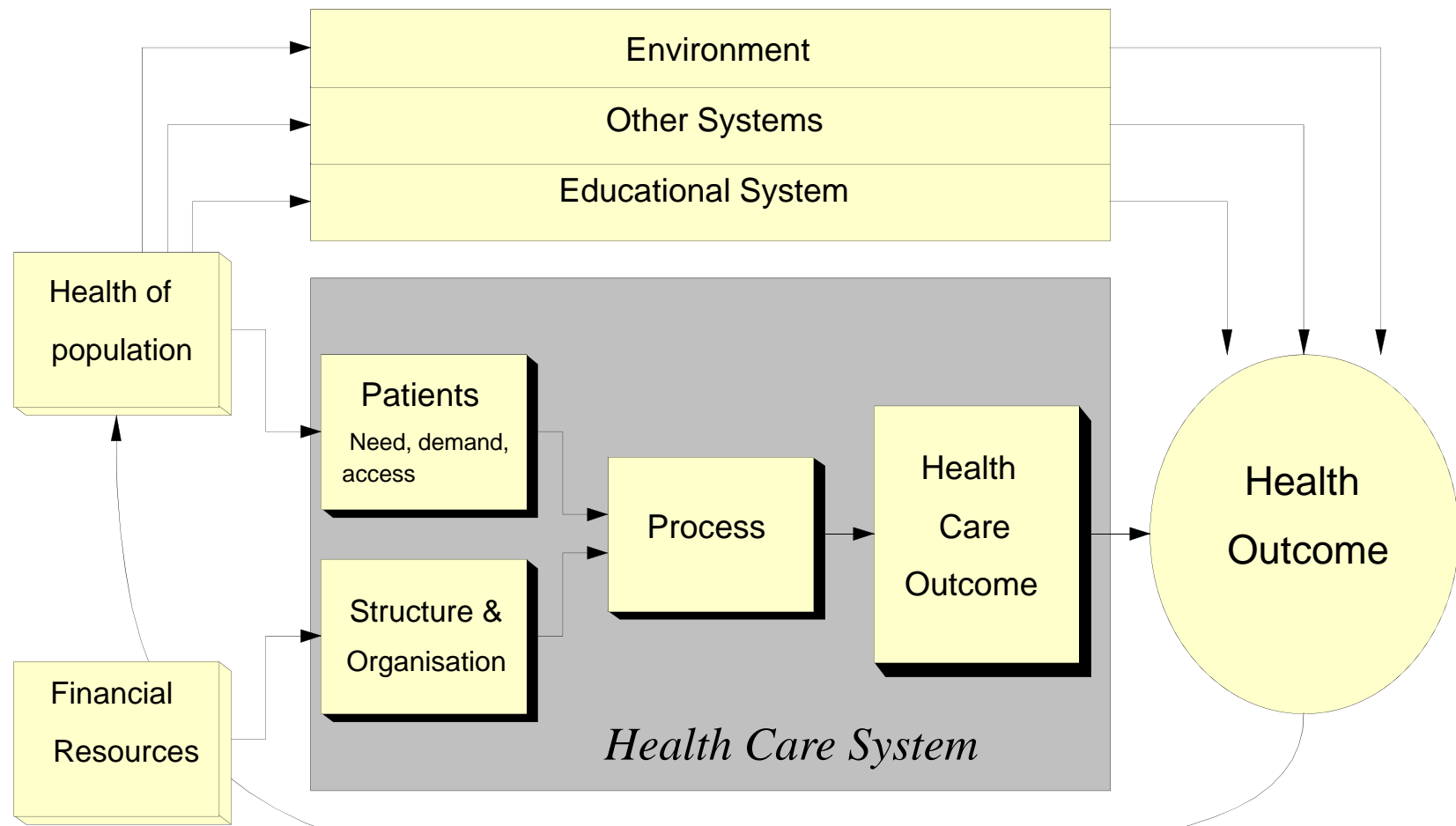
Source: [Spencer – unpublished]

p56 For the sake of children: social
paediatrics in action ed. M.McKee
Karlstadt University 2013





What should we measure?!



Adapted from Nolte

How to begin?

“The secret of getting ahead is getting started.

The secret of getting started is breaking your complex overwhelming tasks into small manageable tasks, and then starting on the first one.”

- *Mark Twain*



What makes an intervention complex?

Some dimensions of complexity

- Number of and interactions between components within the experimental and control interventions
- Number and difficulty of behaviours required by those delivering or receiving the intervention
- Number of groups or organisational levels targeted by the intervention
- Number and variability of outcomes
- Degree of flexibility or tailoring of the intervention permitted

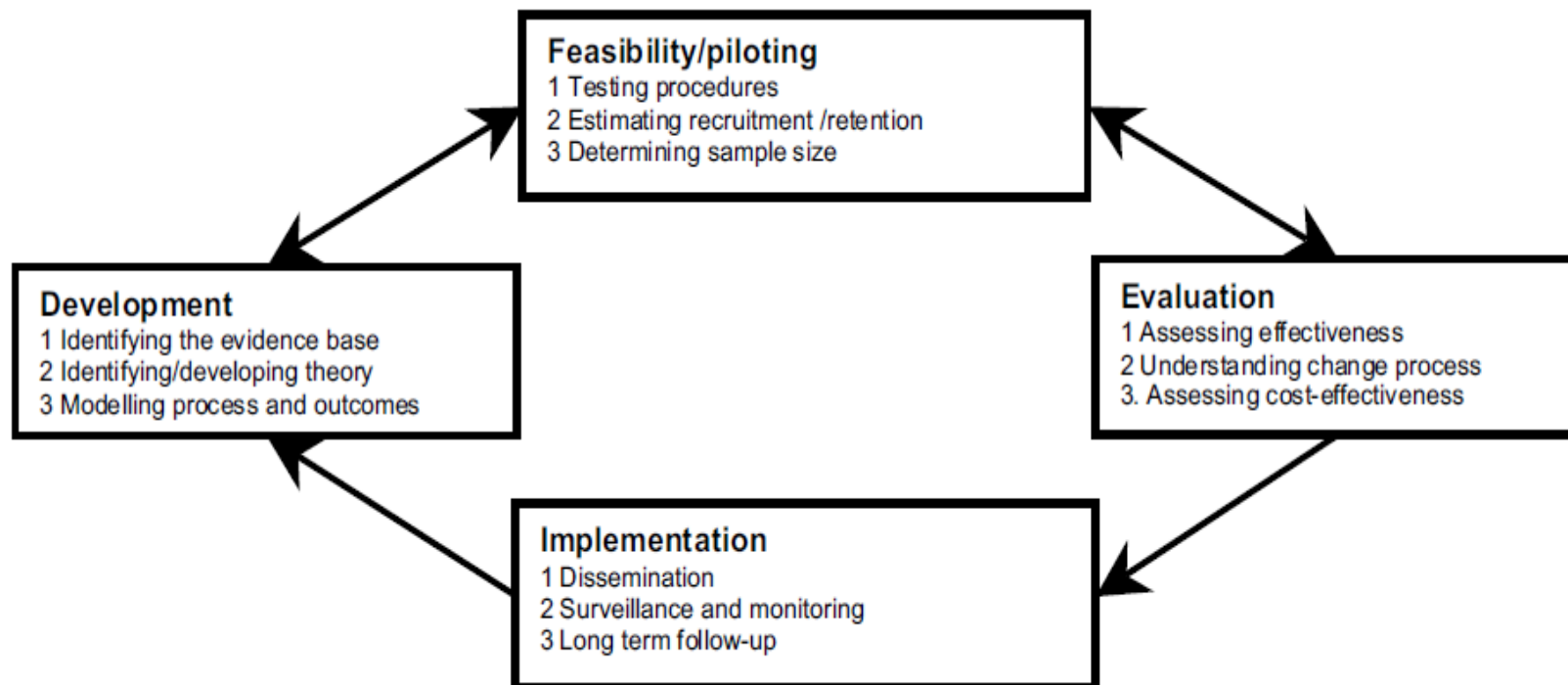
MRC Developing and
evaluating complex
interventions

Implications for development and evaluation ?

- A good theoretical understanding is needed of how the intervention causes change, so that weak links in the causal chain can be identified and strengthened
- Lack of impact may reflect implementation failure (or teething problems) rather than genuine ineffectiveness; a thorough process evaluation is needed to identify implementation problems.
- Variability in individual level outcomes may reflect higher level processes; sample sizes may need to be larger to take account of the extra variability, and cluster- rather than individually-randomized designs considered.
- Identifying a single primary outcome may not make best use of the data; a range of measures will be needed, and unintended consequences picked up where possible.
- Ensuring strict fidelity to a protocol may be inappropriate; the intervention may work better if adaptation to local setting is allowed.

MRC Developing and
evaluating complex
interventions

Key steps



MRC Developing and
evaluating complex
interventions

How do you choose between randomised and non-randomised ?

- Size and timing of effects
- Likelihood of selection bias
- Feasibility and acceptability of intervention
- Cost

Evaluation methods

- RCT
- Cluster RCT
- Stepped wedge RCT
- Preference trials
- N of 1

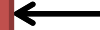
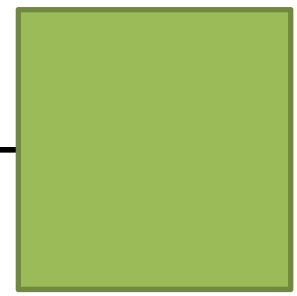
Causal pathways and theory

- Action Effect Method

- Understanding different perspectives of complex systems
- Shared vision
- Capturing expert and tacit knowledge
- Structured dialogue
- Logically defined structured framework
- Articulates cause and effect hypothesis

EFFECT

ACTION



Achievement
of aim

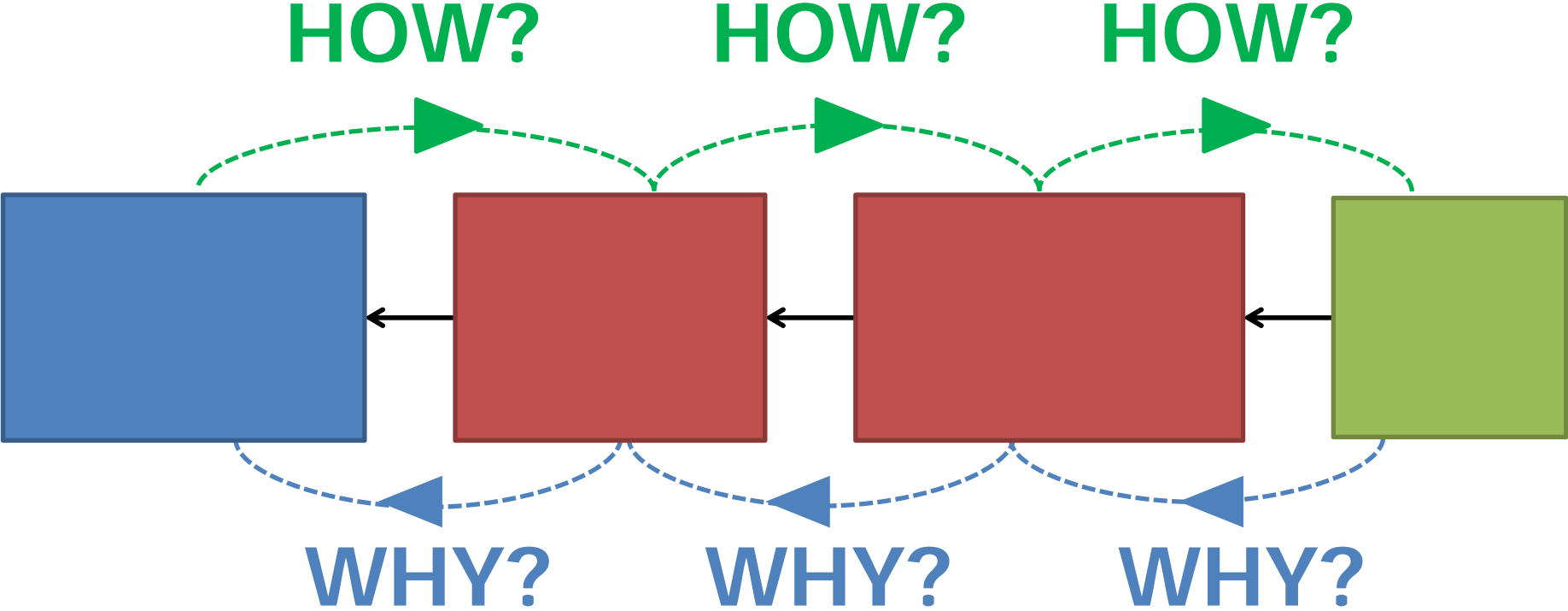


Intervention

Outcome

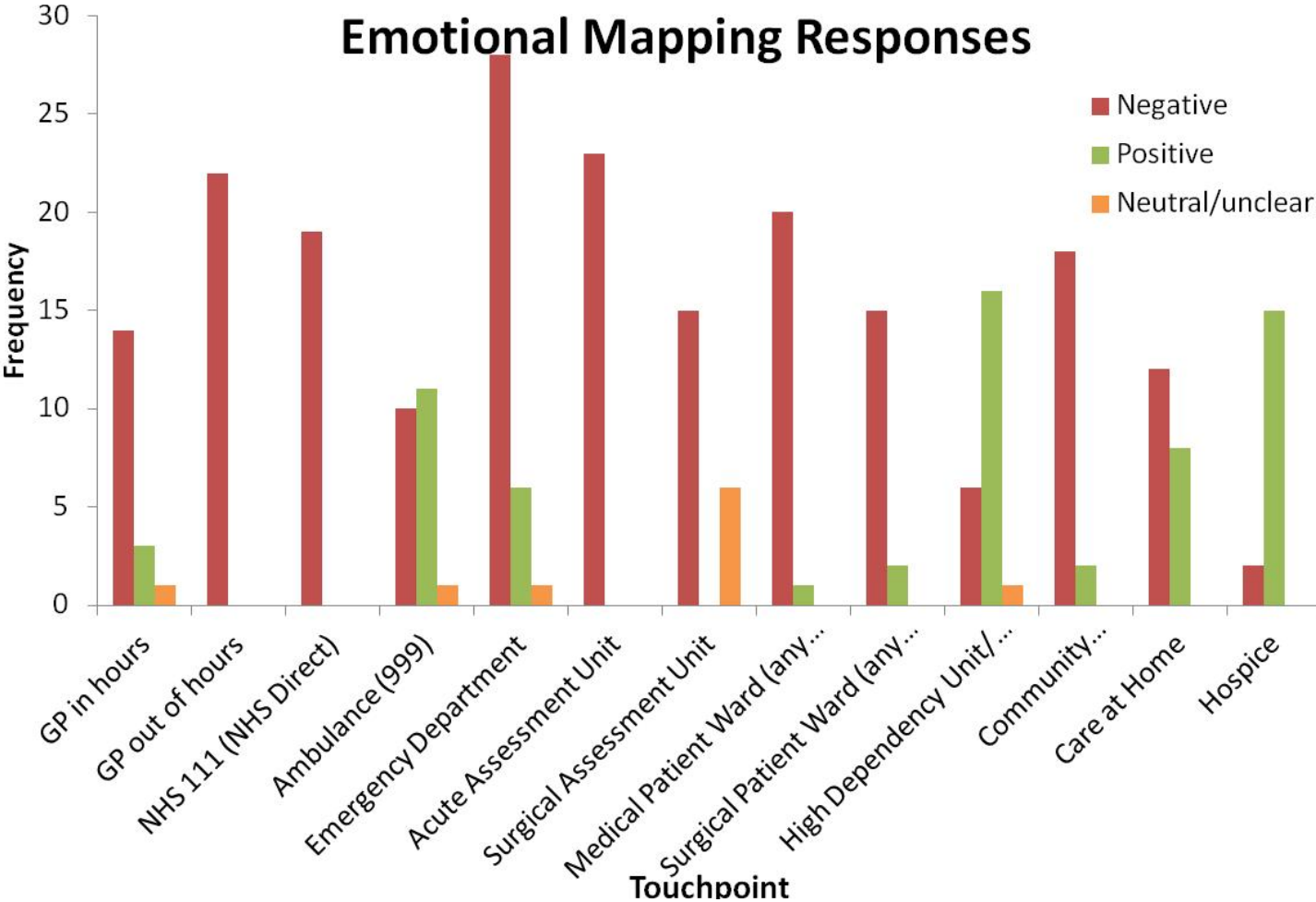


Process



Emotional Mapping Exercise: Understanding patient perspective

Positive/negative emotions over system



Allergies

Draft Action-Effect Diagram 22/01/2014

*Deliver high-value
holistic care for
children with
long-term
conditions
including
transition to
independent
adults*

Allergies

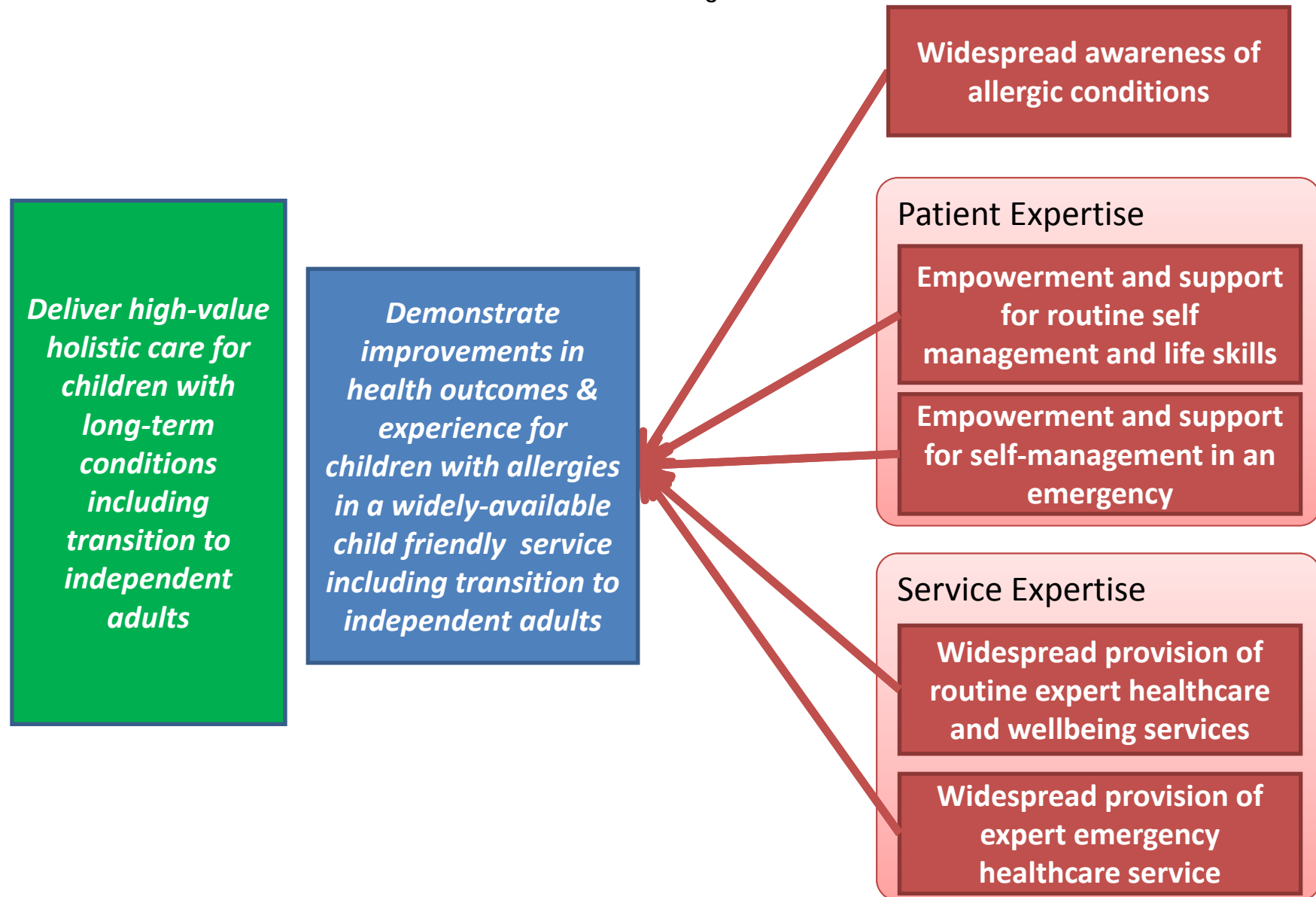
Draft Action-Effect Diagram 22/01/2014

Deliver high-value holistic care for children with long-term conditions including transition to independent adults

Demonstrate improvements in health outcomes & experience for children with allergies in a widely-available child friendly service including transition to independent adults

Allergies

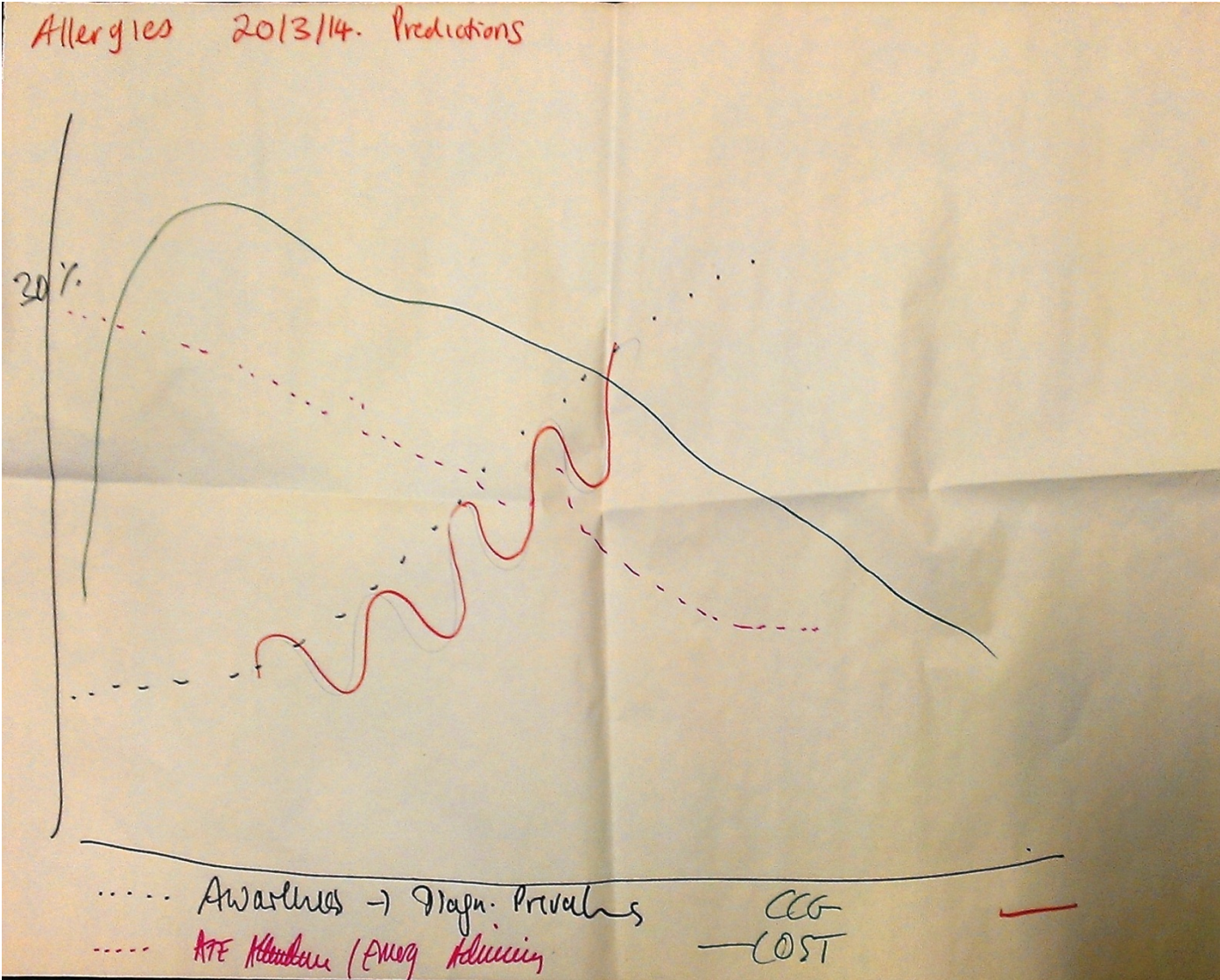
Draft Action-Effect Diagram 22/01/2014



Success looks like

- Less kids with asthma
- 90% mild mod allergy looked after well in primary care
- Severe complex being triaged promptly/ appropriately into the right services
- Less exacerbations ending up in A&E
- Happy children/ parents/ doctors/ and school + wider community
- Less time off
- More knowledgeable children and parents and drs – self management
- Increased awareness and interventions –
 - Medical school/ community seek help
- Rank – parallels
- Prevention – secondary – early recognition = diagnoses
- Earlier treatment – not having to go 6/8 time
- Intervention – cost neutral/ benefit
- Reduced admission – outcome measures Quality and better PREMs
- Re-engagement of primary care with children and allergies

Success looks like



Co-Production!

<http://www.itchysneezywheezy.co.uk/>

Evaluation to date

- Reduction in unscheduled care (interrupted time series)
- Increased knowledge of practitioners/parents and patients
- Improved experience of patients (PREM)
- Patient reported outcomes (asthma PROM)
- Next steps Cluster RCT /Wedge design?
-or is effect size so great that not needed?

Conclusions

- Implementation of evidence based interventions is HARD!
- Complex child public health interventions often need a multi-method *formative and summative* evaluation
- Joint agreement on causal pathways and processes is a useful first step