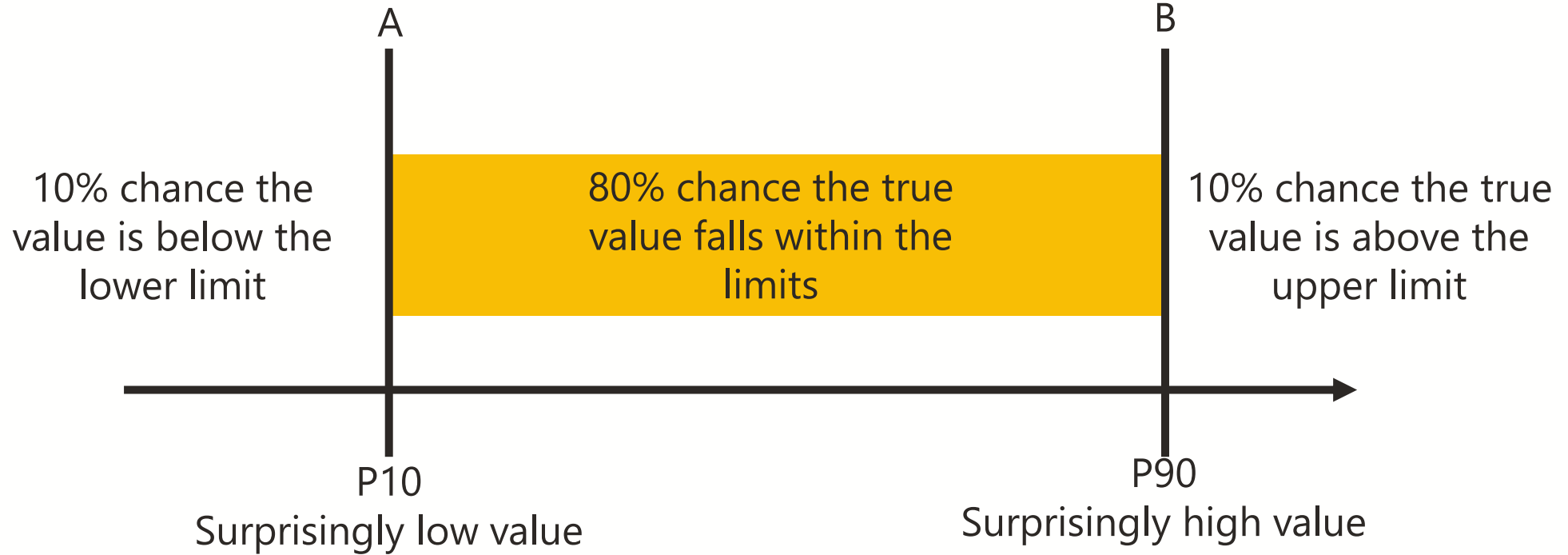


# Forecasting uncertainty

# 80% confidence interval



# Exercise

Ten general knowledge questions.

For each question, provide a 80% confidence interval.

In your judgement, there should be

- a 10% chance that the true value lies below the lower limit
- a 10% chance that the true value lies above the upper limit

**Don't agonise over it.**

**This is not a test of your general knowledge.**

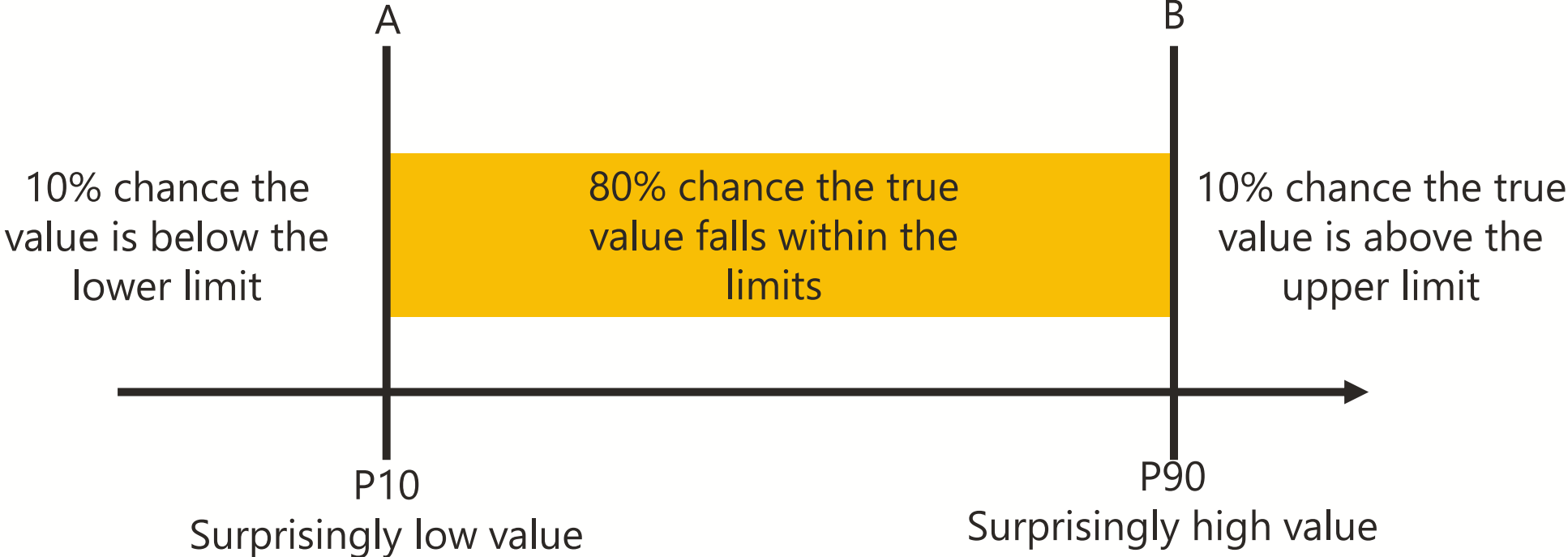
**You must give answers to each question.**

		<b>Lower bound</b> 10% chance value is lower	<b>Upper bound</b> 10% chance value is higher	
1	When was Elvis Presley born?			
2	How many miles tall is Mount Everest?			
3	What percentage of the atmosphere is oxygen by weight?			
4	The first European printing press was invented in what year?			
5	What percentage of all electricity consumed by U.S. households in 2001 was used by kitchen appliances?			
6	What percentage of a square could be covered by a circle of the same width?			
7	In what year did Isaac Newton publish the universal laws of gravitation?			
8	At how many miles per hour can a peregrine falcon fly in a dive?			
9	How many calories are in 8 ounces of orange juice?			
10	How many people were permanently evacuated after the Chernobyl nuclear power plant accident?			

Count the number of instances where the answer fell between your upper and lower bound

		<b>Lower bound</b> 10% chance value is lower	<b>Upper bound</b> 10% chance value is higher	<b>Answer</b>
1	When was Elvis Presley born?			<b>1935</b>
2	How many miles tall is Mount Everest?			<b>5.5</b>
3	What percentage of the atmosphere is oxygen by weight?			<b>21%</b>
4	The first European printing press was invented in what year?			<b>1450</b>
5	What percentage of all electricity consumed by U.S. households in 2001 was used by kitchen appliances?			<b>26.7%</b>
6	What percentage of a square could be covered by a circle of the same width?			<b>78.5%</b>
7	In what year did Isaac Newton publish the universal laws of gravitation?			<b>1685</b>
8	At how many miles per hour can a peregrine falcon fly in a dive?			<b>200</b>
9	How many calories are in 8 ounces of orange juice?			<b>120</b>
10	How many people were permanently evacuated after the Chernobyl nuclear power plant accident?			<b>135,000</b>

# 80% confidence intervals



# Reflections

If the intervals you gave **were** 80% confidence intervals, for how many questions would you expect (on average) the answer to fall within the intervals?

Why do you think that most people scored less than 8?

What can we take from this?

If you repeated the exercise, on a different set of questions, what might you do differently?

# The outside view and using 'base rates'





## Inside View

# Harry Kane exclusive: England captain believes Three Lions can win 2022 World Cup in Qatar

England captain Harry Kane exclusively tells *Sky Sports* ahead of 2022 World Cup: "I look back at England 10, 15 years ago and it was almost [like] we were scared to say we wanted to win it. We're going to this tournament to win it because we believe we can"

🕒 Wednesday 16 November 2022 16:21, UK

## Outside View

World Cup 2022 Predictions			Opta			
			QF	SF	Final	WINNER
	1	Brazil	63.7%	40.2%	25.3%	15.8%
	2	Argentina	55.3%	36.3%	21.1%	12.6%
	3	France	58.8%	37.3%	21.9%	12.2%
	4	Spain	55.1%	31.6%	17.4%	9.1%
	5	England	56%	30.9%	17%	8.7%
	6	Germany	51%	28.7%	15.4%	7.8%
	7	Netherlands	53.1%	27.5%	14%	7.2%
	8	Portugal	47.2%	24.1%	12.2%	5.8%
	9	Belgium	41.6%	22.2%	11.3%	5.4%
	10	Denmark	39.3%	19.4%	8.5%	3.5%

# Cable Car Plunges; 27 Hurt

MONDAY

RACING  
RESULTS-ENTRIES

## Los Angeles Times

# FINAL

LARGEST CIRCULATION IN THE WEST, 861,350 DAILY, 1,812,983 SUNDAY

VOL. LXXXVII

SEVEN PARTS—PART ONE

MONDAY MORNING, DECEMBER 4, 1967

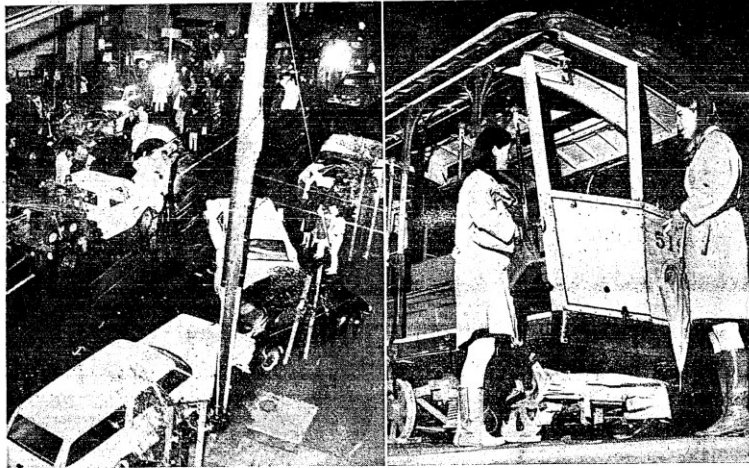
132 PAGES

Copyright © 1967  
Los Angeles Times

DAILY 10c

# MEDICAL TRIUMPH

## First Human Heart Transplanted



**CABLE CAR SMASHUP**—Burned and wrecked autos are strewn along San Francisco's rain-slick Hyde St. after cable car plunged three blocks

down the hill when cable slipped Sunday night. At right, two passersby examine front of the car, which sustained comparatively little damage.

### South African Gets New Life From Woman Dead in Crash

CAPE TOWN, South Africa—A South African hospital Sunday made medical history with the world's first human heart transplant. Surgeons removed the heart of a young woman who died after an automobile crash and placed it in the chest of a 55-year-old man, dying of heart damage, a hospital announcement said.

When the transplanted heart was in place, it was started beating by an electric shock, said Dr. Jan H. Louw, hospital chief surgeon. He added: "It was like turning the ignition switch of a car."

Groote Schuur Hospital said the man was in satisfactory condition late Sunday, but that the next few days would be a critical period.

**Heart Removed From Body**  
The heart was removed from the body of Denise Ann Darvall, 25, an accounting machine operator at a bank, and transferred to Louis Washkansky, a wholesale grocer, the hospital said.

Washkansky was reported fully conscious and in very satisfactory condition after the five-hour operation that ended at 6 a.m. The announcement said his blood pressure was normal by Sunday afternoon.

In the first stage of the heart transplant operation, both Washkansky and the body of Miss Darvall were put on heart-lung machines, each manned by a team of technicians.



**HEART USED** — Denise Darvall was identified as the young woman whose heart was transplanted into a man after she died in car crash.

Washkansky nearly took place last Wednesday with another donor but

What chance did the surgeon give his patient?

"What chance do you give him" asked the patients wife

"An 80% chance" replied Barnard

18 days later the patient died

*“Around 60 percent of new restaurants fail within the first year. And nearly 80 percent shutter before their fifth anniversary.”*

<https://www.cnbc.com/2016/01/20/heres-the-real-reason-why-most-restaurants-fail.html>

*“42% of marriages end in divorce”*

Relate factsheet

*“70% of all projects fail to deliver what was promised to customers.”*

<https://teamstage.io/project-management-statistics/> [dose of salt required]

*“...about half of new hires fail within 18 months”*

<https://sowelo.eu/unsucessful-recruitment/> [salt again]

*“...between 70 and 90 percent of acquisitions fail”*

<https://hbr.org/2020/03/dont-make-this-common-ma-mistake>

*“On average, large IT projects run 45 percent over budget and 7 percent over time, while delivering 56 percent less value than predicted”.*

<https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/delivering-large-scale-it-projects-on-time-on-budget-and-on-value>

Pick an appropriate comparison; use this as a ‘base rate’ and then work out why your case is different

## How likely is it that your plan will succeed?

All decisions are an **uncertain bet** on the future. Being explicit about this can help decision makers

But we create incentives that play to our in-built – and well-known - **optimism**. We make people bid for funding, write business cases, convince panels (etc)

The case they have to make is both **positive** (*'back this because...'*) and **'inside out'** (*'we'll be good at this, because...'*). Both are bad for planning

So can we use **'outside in'** thinking?

Why should your project be any more / less successful than is usual for this type of activity?

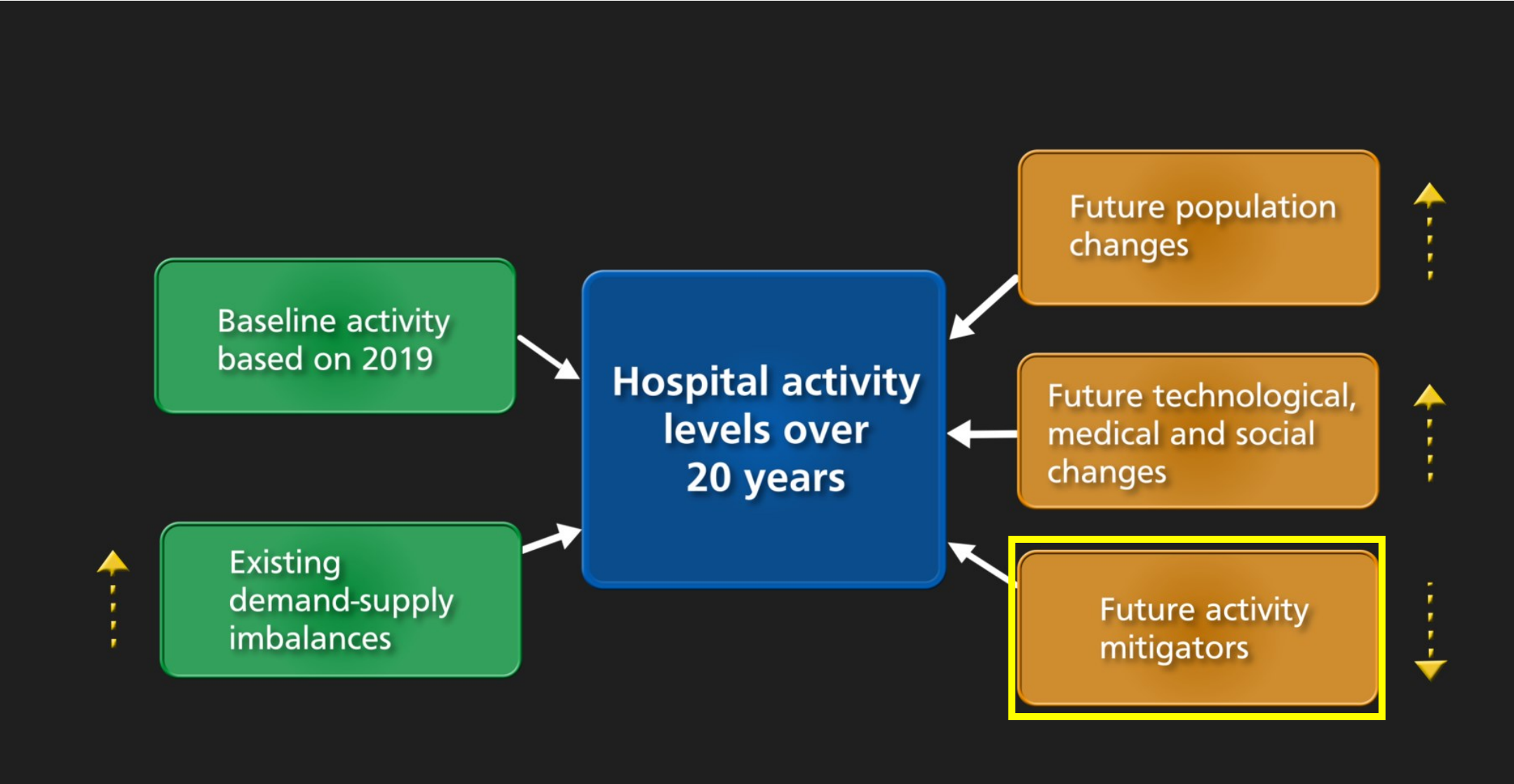
Why do you think you're different to the **'base rate'**?

## Even simpler:

Ask someone who knows this area of work well, but who has no stake in your success, what they think your chances are

# **National Elicitation Exercise**

# Overview of model



## 77 hospital activities in 8 groups

Hospital activity group	Type of mitigation					
	A&E attendance avoidance	Inpatient admission avoidance	Length of stay reduction	Outpatient attendance avoidance	Outpatient delivery mode	Total
Emergency department and acute medicine activity	12		4			<b>16</b>
Hospital activity amenable to medicines managements		5				<b>5</b>
Hospital activity amenable to primary care and community		10	4			<b>14</b>
Hospital activity amenable to psychiatric liaison and community psychiatry		3	1			<b>4</b>
Hospital activity amenable to public health interventions		6				<b>6</b>
Planned medical activity (adult)				2	1	<b>3</b>
Planned surgical activity (adult)		7	13	2	1	<b>23</b>
Planned paediatric activity				4	2	<b>6</b>
<b>Total</b>	<b>12</b>	<b>31</b>	<b>22</b>	<b>8</b>	<b>4</b>	<b>77</b>



# Methodology

Ethical approval

Frame the forecasting for England (not a specific hospital)

Recruitment of domain experts via Transformation Directorate of NHP

Training – overview of NHP Model and probabilistic forecasting

Data collection – online app - round 1 and round 2

Final Analysis – round 2 (n=17 experts)

Min experts making a forecast = 3 or 4 (10% of forecasts)

Median = 10

Max = 13

Literature suggests 6-12 is usually adequate

# Online NEE app with data at England level only

Falls Related Admissions

Previous Next

Strategy

Falls Related Admissions

Parameter Setting

Financial Year of Admission	Rate per 100 Admissions
2010/11	3.6
2011/12	3.7
2012/13	3.7
2013/14	3.7
2014/15	3.6
2015/16	3.8
2016/17	3.8
2017/18	3.9
2018/19	3.9
2019/20	3.9
2020/21	2.5
2021/22	1.5
2022/23	0.8
2023/24	0.4
2024/25	0.2
2025/26	0.1
2026/27	0.05
2027/28	0.02
2028/29	0.01
2029/30	0.005
2030/31	0.002
2031/32	0.001
2032/33	0.0005
2033/34	0.0002
2034/35	0.0001
2035/36	0.00005
2036/37	0.00002
2037/38	0.00001
2038/39	0.000005
2039/40	0.000002

Percentage Reduction

0 100

What factors make it a surprisingly low % reduction

P10

What factors make it a surprisingly high % reduction

P90

Progress

44%

Description

Some falls that result in an emergency admission to hospital are potentially avoidable if the appropriate preventative services are in place. A range of evidence based services and interventions exist that can reduce falls in the elderly. Implementation across the country is variable and as such there remains significant scope to reduce the incidence of falls further. Examples of preventative services include home risk assessments for trip hazards, strength and balance training for those at risk and fall telemonitoring.

Falls related admissions are identified in the tool in a number of ways:

- spells where there is a falls related ICD10 cause code and a traumatic injury (explicit),
- spells where the primary diagnosis is R296 (Tendency to fall)
- spells where there is no external cause ICD10 code but there is a diagnosis of one of a number of fractures that are commonly associated with a fall such as a fractured wrist

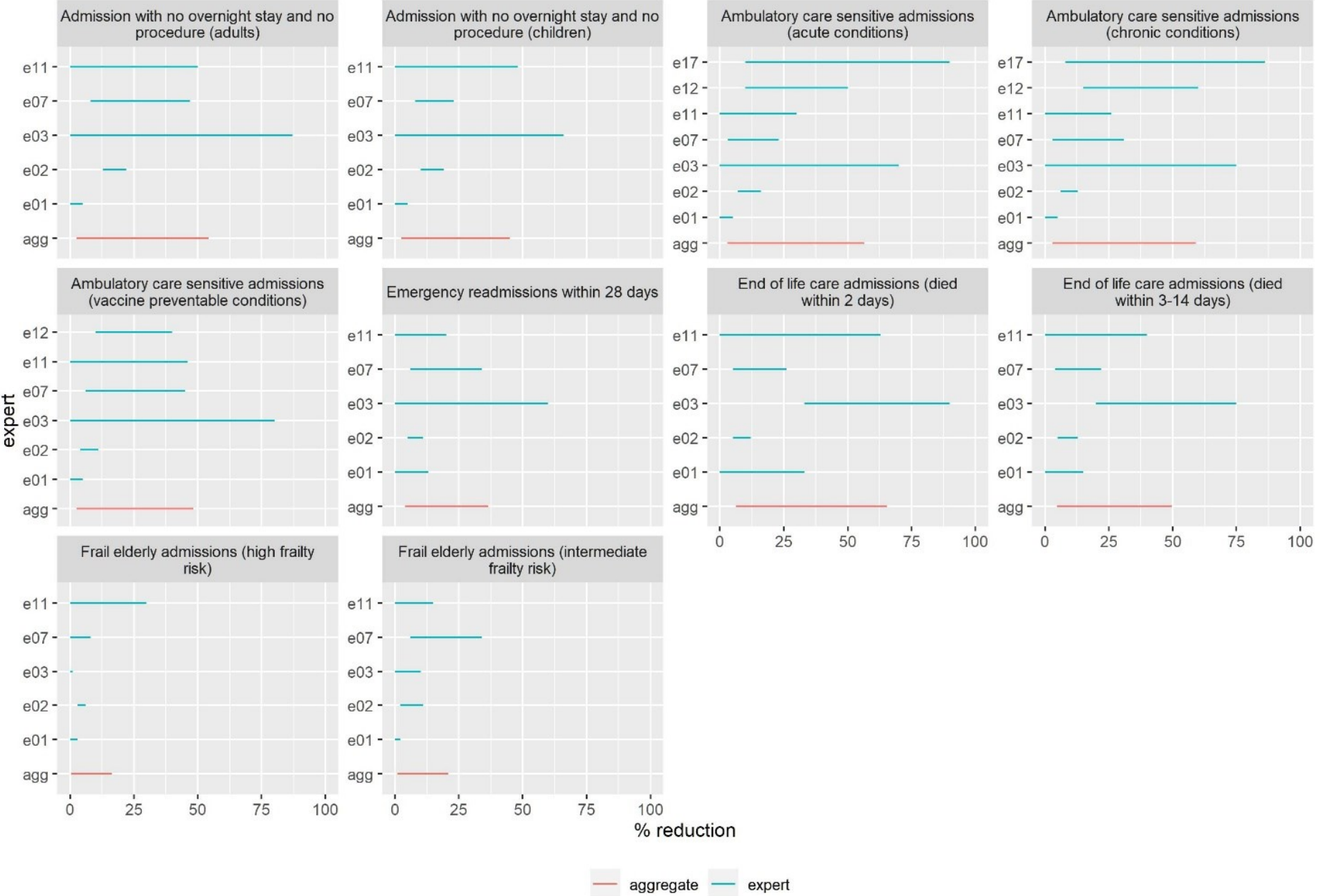
Within the tool the three sets of admissions are grouped, in this case, into a single factor.

N=77 parameters with age sex standardisation where appropriate

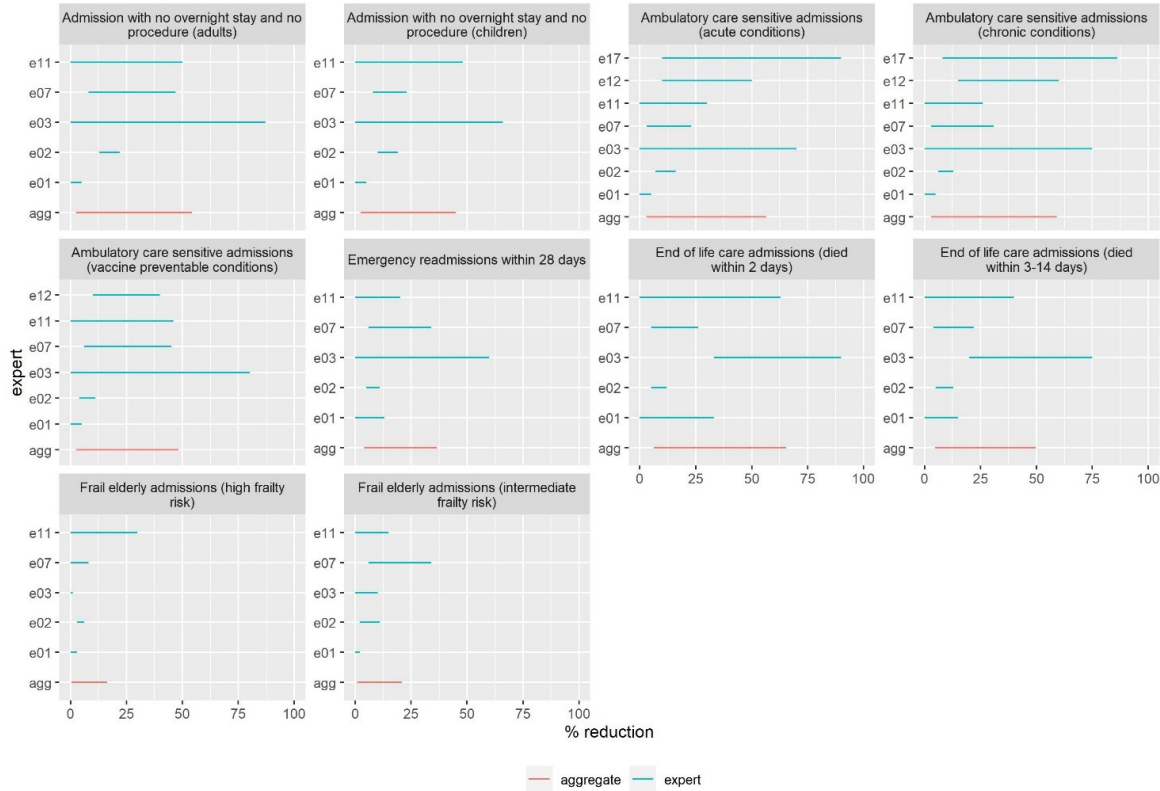
# Example individual & aggregate forecasts

## Hospital activity amenable to primary care and community interventions : inpatient admission avoidance

expert views (80% confidence intervals)



Hospital activity amenable to primary care and community interventions : inpatient admission avoidance  
expert views (80% confidence intervals)

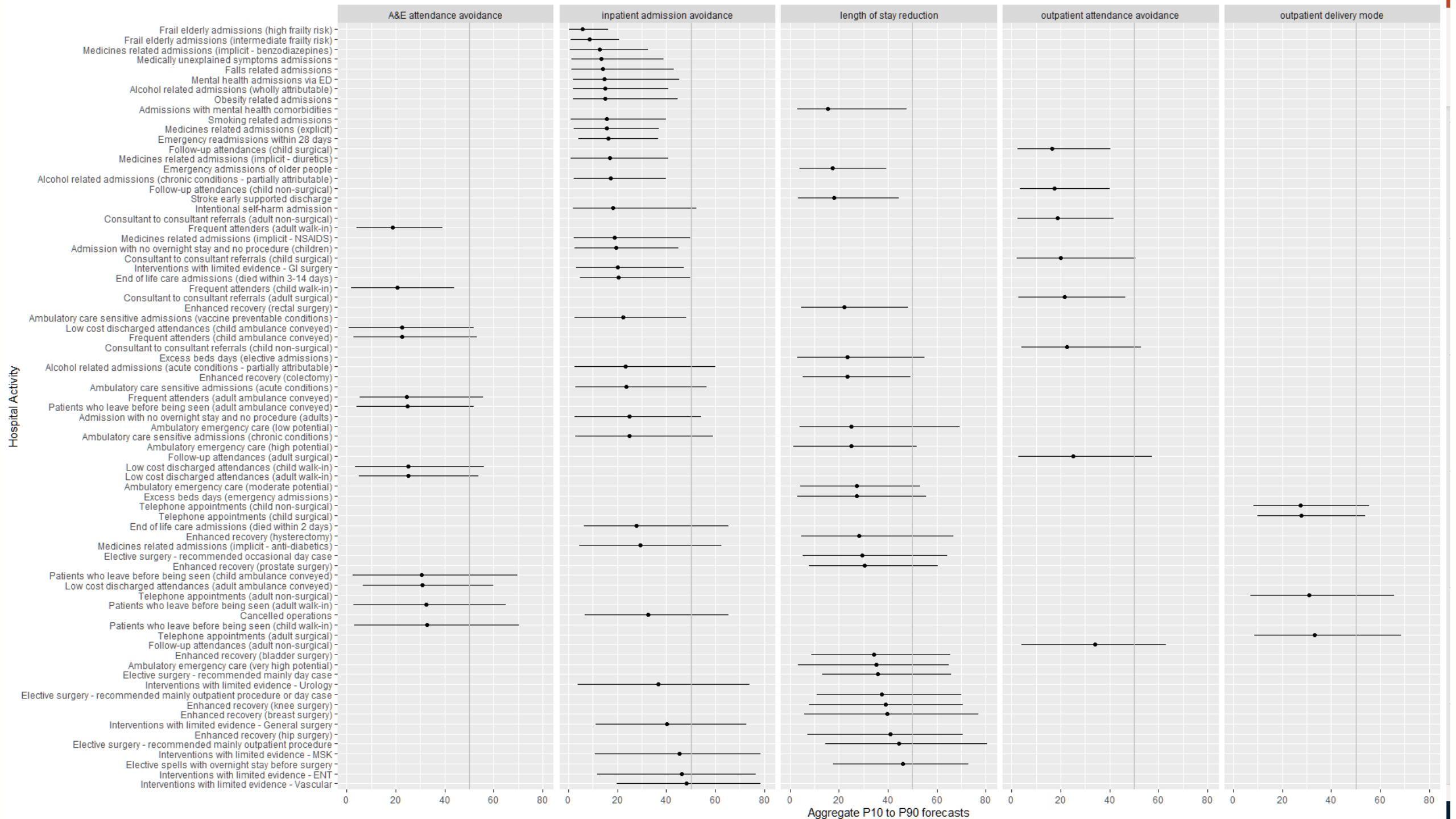


### Rationale for P10 values

Lack of preventive mechanisms. Examples were poor access to primary care, lack of education, and insufficient community and social care resource. Other comments were citing a lack of alternatives to substitute or relocate care to out of hospital settings, inefficiencies in current care practices and the challenges of redirecting care. For instance, SMEs highlighted insufficient investment in digital technology to support monitoring and remote consultations in the management of long-term conditions as well as the inadequate staffing of frailty multidisciplinary teams.

### Rationale for P90 values

Some of the key themes related to preventive measures such as future government policy and public health management initiatives resulting in improvements to housing, heating, nutrition, and transport as well as measures to reduce obesity, loneliness, alcohol consumption and smoking. Other common factors for preventive mechanisms included improved access to primary and dental care, significant investment in community services and social care and improved chronic disease management



“The prevalent tendency to **underweight or ignore distributional information** is perhaps the major source of error in forecasting. Planners should therefore make every effort to frame the forecasting problem so as to facilitate utilizing all the distributional information that is available.” (p. 251)

“This may be considered the single most important piece of advice regarding how to increase accuracy in forecasting through improved methods. Using such distributional information from other ventures similar to that being forecasted is called taking an **“outside view”** and is the cure to the planning fallacy.” (p. 251)

## **Inside vs Outside view**

D Khaneman. Thinking, Fast and Slow



Share your  
insights...



Any key insights...



So what...  
(any scope for application)



One wish...