

# Cognition in DM CKD

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# Expectations !!

1. Ageing Hospital population
2. Dementia impact
3. Cognition in CKD
4. Cognition and DM
5. Can Liaison Psychiatry do any good in acute hospitals?

# Population projections

- Current UK estimates for female life expectancy at birth are 83.0 years and 79.3 years for men.
  - But, estimates at the age of 65 are 86.1 for women and 83.6 for men.
- People currently aged 75 can expect to live an average of 13.0 years (for women) and 11.2 years for men
- By 2040, nearly one in four people in the UK will be aged 65 or over.
  - A baby born in 2011 is almost eight times more likely to reach 100 than one born in 1931.
  - Nearly one in five people currently in the UK will live to see their 100th birthday.
- In 2011, 32% of people aged 65 and over who were admitted to hospital were found to be malnourished at the time of admission.
- In 2010, 21% of adult inpatients in England said that they were not always treated with respect for their dignity. This result has not improved since the first survey in 2002 (!!!).

# Hospital care

- 16 million adults admitted to hospital last year, almost 8 million (47%) were aged 65+.
  - Up to 60% of older people in hospital have mental health problems or develop them during their stay
- Older people occupy two third of NHS beds!!
  - 48% for reasons other than the need for acute medical intervention
  - 30-50% have dementia, delirium or other cognitive impairment.
- National Audit Office; More people with dementia in acute hospital beds than in mental health beds,
  - Only 41% had received an assessment of mental state of any sort.
  - 70% of older people referrals to liaison services are not under the care of mental health services.
- Length of Stay in Acute Hospitals 2000-2010,
  - hospital stay for 60-74 increased by 50%, over 75 by 66%.
- In a typical acute hospital (500 beds), failure to organize dementia liaison services leads to excess cost of £6m/year
- Of people aged over 70 admitted to an acute hospital
  - 27% have previously diagnosed dementia
  - 50% have cognitive impairment
  - 27% have delirium
  - 24% have possible major depression
  - 8% have definite major depression

# Dementia and Outcome measures

- The majority of mental co-morbidity in acute hospital affecting older people is due to three disorders:
  - **Dementia,**
  - **Depression**
  - **Delirium.**
- **Mental disorder in older adults is a predictor of:**
  - **Increased LOS**
  - **Increased readmissions**
  - **Increased Institutionalism (impacting on performance and efficiency)**
  - **Increased mortality**
  - **Increased falls**
  - **Other poorer outcomes**
- But, only 2-3% of older people admissions to acute hospitals are referred for a psychiatric opinion;
  - elderly are less likely to be referred to liaison psychiatry than younger people in relation to the proportion of beds they occupy.

# Undiagnosed Dementia in Acute Hospitals

- Dr. A Michael, 2014
- Russell Hall Hospital, Dudley, West Midlands
- 1107 patients admitted to acute hospital
- No known history of dementia on admission.
- 42% screen positive for dementia
- Q Whether there is Delirium?
- Q Where is the link between community care and hospital care?

Age Group	AMT < 8	%
75- < 80	49/192	26
80- <85	106/288	37
85- <90	178/369	48
90- <95	102/207	49
95- <100	32/48	67
100+	2/3	67
Total	469/1107	42%

Hospitals on the  
edge.

Can our hospitals  
or even NHS  
survive without  
better and more  
effective dementia  
care?



# Treat as One

Bridging the gap between mental and  
physical healthcare in general hospitals





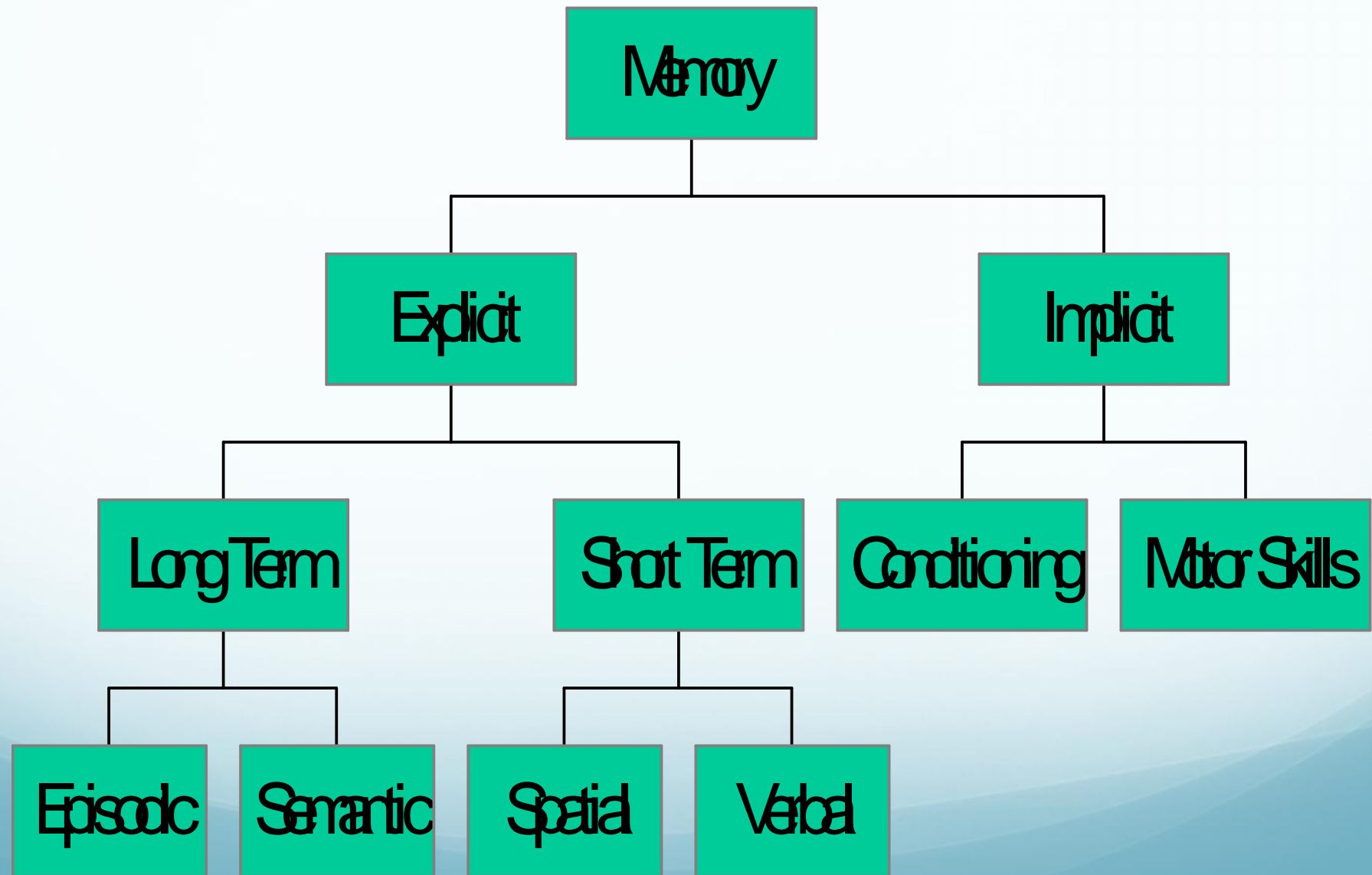
# Features of normal ageing

- ◆ Decreased sensory processing and under-arousal
- ◆ Slowed neuronal processing
- ◆ Decreased complex and sustained attention
- ◆ Accentuation of personality traits
  - Decreased flexibility and tolerance to change
  - Decreased excitability & impulsivity; more cautious
- ◆ Ageing and intelligence:
  - Preserved crystalized intelligence
  - Decreased fluid intelligence
  - Stable verbal IQ but decline in performance IQ
- ◆ Decrease in naming ability
- ◆ Decrease in primary and working memory
- ◆ Decreased retrieval of stored memory
- ◆ Language relatively well spared
- ◆ Sleep; fragmented, increased daytime somnolence

# Definition of dementia

- Cognition is the ability to use and integrate basic capacities such as perception, language, behaviour, actions, memory and thoughts in order to interact appropriately with the world.
- Dementia is an acquired, persistent impairment in multiple areas of intellectual function, not due to delirium.
- Operationally, there is a compromise in three or more of the following nine spheres of mental activities:
  - Memory, language,
  - perception, praxis,
  - calculation, conceptual or semantic knowledge,
  - executive functions, personality, emotional expression.

# What is Memory





# Prevalence of Dementias

- 0.01% before the age of 40.
- 5-8% of all individuals over 65.
- 15-20% of all individuals over 75.
- 25-50% of all individuals over 85.
- 60-80% of all individuals over 95.
- 90% of all individuals over 100
- 100% of all individuals over ??
- 50% of all individuals in nursing homes.
- 820,000 persons in the UK.













**Irony ends in pathos** in Saul Steinberg's 'Untitled, 1954', a version of the traditional diagram of the Ages of Man. The successful man rises from infant, through boy scout, academic, business man, tycoon to... playboy on a beach in Florida, retired, relaxed, happy but — useless.



# Size and cost of Dementia

- It is estimated that 35.6 million people living with dementia worldwide in 2010,
  - increasing to 65.7 million by 2030 and 115.4 million by 2050.
  - The total estimated worldwide costs of dementia are US\$604 billion in 2010.
  - The United Dementia Republic
    - What if dementia was a republic in terms of population economy?
    - It would have ranked 18th Largest economy in the world
- About 70% of the costs occur in Western Europe and North America.
- 820,000 people with dementia in the UK
  - The cost of dementia care exceeds that of cancer, heart disease and stroke combined.
  - £17 billions/ year
  - Triple to £50 billions/ year over the next 30 years

# Risk Factors for AD and VaD

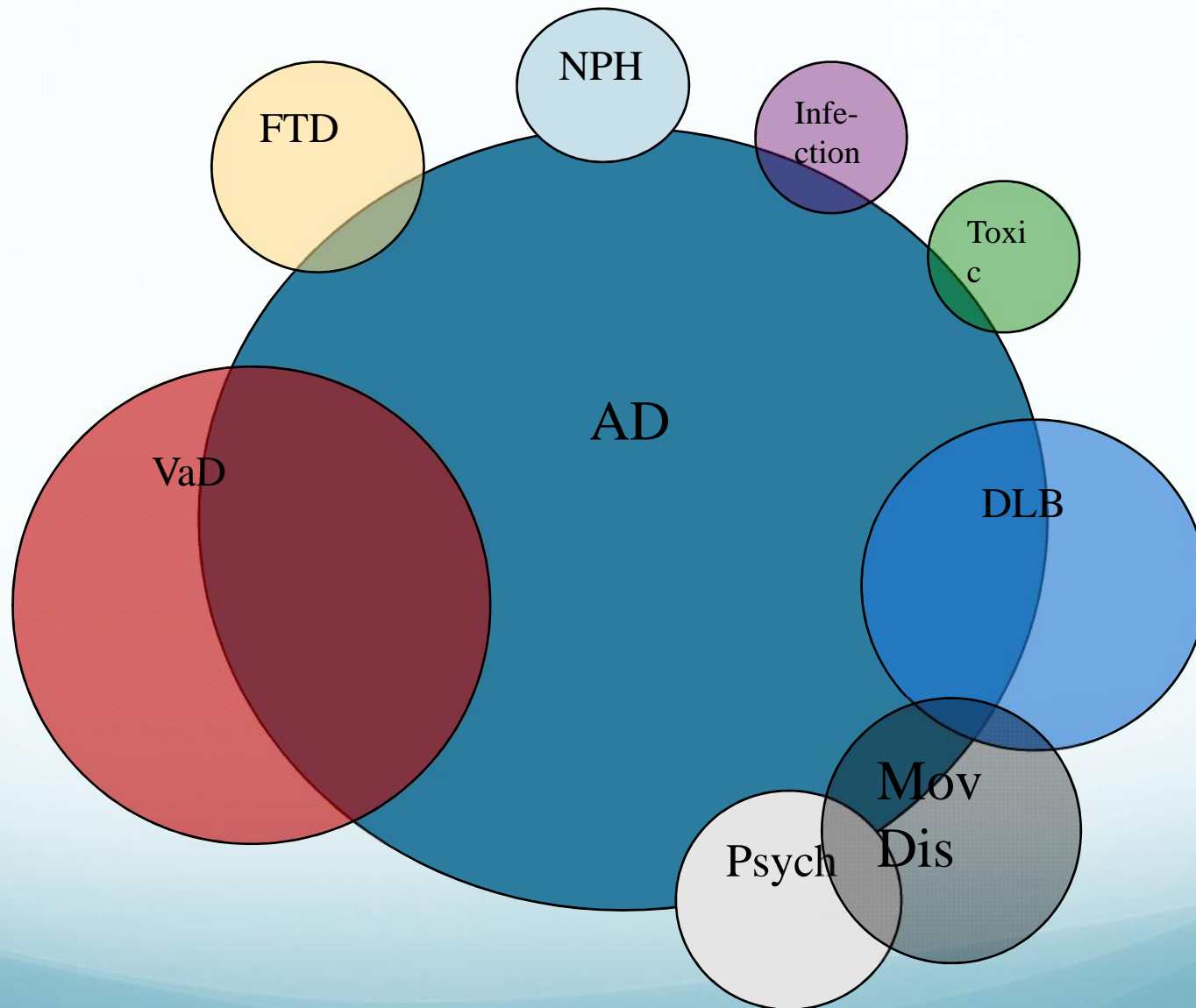
## Modifiable Risk factors:

- ♦ Stroke.
- ♦ Midlife Hypertension.
- ♦ Midlife obesity
- ♦ Diabetes.
- ♦ Smoking.
- ♦ Elevated level of low-density lipids.
- ♦ Alcohol consumption (U-curve)
- ♦ Psychological stress.
- ♦ Cognitive inactivity
- ♦ low educational attainment
- ♦ Physical inactivity
- ♦ Sodium intake
- ♦ Exposure to environmental toxins
- ♦ Depression

## Un-modifiable risk factors:

- ♦ Age
- ♦ Gender; female
- ♦ Family History
- ♦ Dawn Syndrome
- ♦ ApoE.
- ♦ CADASIL (cerebral autosomal dominant arteriopathy with subcortical infarcts & leukoencephalopathy, linked to Notch3 gene.).

# Types of Dementia



# Diabetes and Dementia

- The AlzRisk AD Epidemiology Database; suggest an association between DM and increased risk for both AD and Vascular dementias.
- Biessels et al (2006) identified 14 eligible longitudinal studies
  - Increased risk of dementia
  - Type 1 Vs Type 2
  - Dementia, sub-types or CMI.
- Vascular disease and alterations in glucose, insulin, and amyloid metabolism may underlie the pathophysiology
- DM type 2 independent predictor of post-stroke dementia
- Barnes and Yaffe (2011); A 10–25% reduction in risk factors could potentially prevent as many as 3.0 million AD cases worldwide.

# Diabetes and Dementia

- Fluoro-2-deoxy-D-glucose positron emission tomography (FDG-PET) imaging has revealed glucose metabolic reductions in the parieto-temporal, frontal and posterior cingulate cortices to be the hallmark of AD.
- Impaired brain glucose metabolism leads to abnormal hyperphosphorylation of tau and neurofibrillary degeneration via down regulation of tau O-GlcNAcylation in Alzheimer's disease.
- It is concluded that the cholinergic deficit, nerve cell atrophy and the amyloid accumulation in the brain are secondary phenomena caused by the 50–70% decline of glucose metabolism in Alz Disease.
- Abnormal brain glucose metabolism in the delusional misidentification syndromes: A positron emission tomography study in Alzheimer disease
- ELAD study
- Imperial; HoEFT a research centre
- Liraglutide

# Dementia and CKD

- Increasing severity of Chronic Kidney Disease (CKD) is associated with a graded increase in prevalence of cognitive impairment
  - decrease in brain perfusion independent of vascular risk factors.
  - Diagnostic methods vary but recent reviews summarise at least moderate cognitive impairment in 30-70% of dialysis patients.
  - Cognitive impairment in HD patients is independently associated with higher rates of depression.
- There are multiple factors CKD and HD specific factors including oxidative stress, malnutrition and inflammation.
  - Co-segregation of atherosclerotic risk factors, cannot entirely account for excess risk.
  - To date, no interventions are proven to slow cognitive decline

# Dementia and CKD

- Cognitive function drops significantly after the start of haemodialysis.
- Haemodialysis might cause worsening of cognitive impairment by inducing haemodynamic instability, fluid shifts, cerebral ischaemia or cerebral oedema
- Evidence suggests that the retention of uraemic toxins which are incompletely cleared by haemodialysis may also be responsible for chronic cognitive impairment.
- HoEFT
  - 100 patients (82 completed both tests), HD
  - T1, T2 and T3
  - Median age was 72 years (53 - 91), 60% male.
  - Median dialysis vintage was 40 months (range: 3 - 388)
  - 28% were diabetic.
  - MoCA, CAM, GDS; before and after
  - At baseline: 62 patients (76%) had CI at baseline (MOCA score 24) with 12 (15%) having severe CI (MOCA <17).
  - Cognitive function declined significantly over a dialysis session (MOCA score  $20.9 \pm 4.9$  to  $19.1 \pm 4.1$ ,  $p < 0.001$ ).
  - 91.5% had cognitive impairment post- haemodialysis (MOCA score 24). All domains of cognitive function were affected except visuo-spatial and naming.
  - On univariate analysis, none of the factors studied correlated with change in MOCA score over HD (MOCA 1 – MOCA 2).
  - Age and dialysis vintage were independently associated with decline in cognitive function.

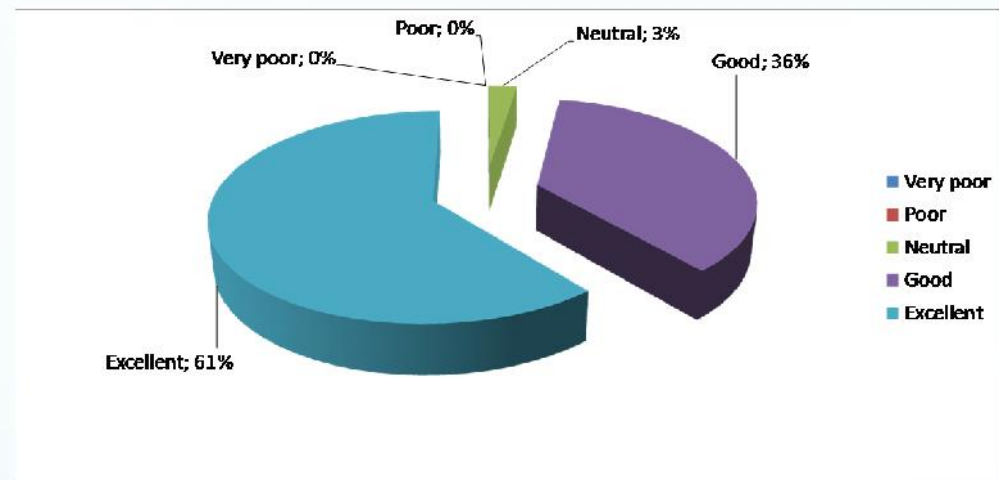
# Rapid Assessment Interface Discharge (RAID)





# Teaching and evaluation

- 4Ds (Dementia, Depression, Delirium and Dignity).
- 2 days training with a month gap for theory application.
- Day 1; theory and scales for measuring.
- Day 2: Management including BPSD
- Feedback and evaluation.



# Savings and wider financial Benefits

## Potential Benefits of RAID

### Outcomes Considered in this Study

1. Inpatient LoS
2. Readmission rates
3. Admission avoidance

Social care £

Complaints

Staff satisfaction

Patient satisfaction

Staff sickness

Acute staff confidence in  
dealing with MH conditions

A&E savings

Demand for community MH services

Discharge destination

MH outcomes

SUIs

Quality

Acute staff training

Referring / Signposting to  
community MH services

Security

# RAID combined total savings: beds/day

- **On reduced LOS**
  - saved bed days/12 months= **13,935** bed days
  - $\div 365 = 38$  days/day (35 beds/day for the elderly)
- **Saved bed days through avoiding admissions at MAU**
  - **Saved bed days = 6 beds / day**
  - **Elderly .. = 6 beds**
- **Increasing survival before another readmission**
  - Admissions saved over 12 months =1800 admissions
  - Average LOS 4.5 days
  - = 8100 saved bed days
  - $\div 365 = 22$  beds/day
  - 20 for the elderly
- **Total Saved beds every day**
  - =  $38 + 22 + 6 = 66$  bed/ day (Maximum) {Elderly: 59 beds/day}
  - =  $21 + 22 + 6 = 49$  bed days (minimum) {Elderly: 42 beds/ day}

✓ **2010: City Hospital has already closed 60 beds.**

# Independent evaluation by London school of Economics, August 2011

- Very thorough, detailed and vigorous review but conservative estimation
- Total savings:
  - £3.55 million to NHS
  - At least 44 beds/day
  - £60,000/week to social care cost
- Money value
  - Cost : return = £1: £4
- RAID expanded in Birmingham to 5 acute hospitals across three acute Trust, 3600 beds
- Now RAID is being implemented in over 27 trusts across the country.
- RAID National Network, 600 members.



# Independent RAID Financial Evaluation by Central Midlands CSU Steven Wyatt, 2013

## Potential Benefits of RAID

### Outcomes Considered in this Study

Inpatient LoS

Readmission  
rates

Time in A&E

A&E re-  
attendance rates

Admission rates  
fro A&E

Time to readmission

Acute £  
Prov / Comm

Complaints

Staff satisfaction

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Acute staff confidence in  
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Social care £

## A&E Financial Outcomes – Concurrent Controls

	Commissioner Cost			Provider Cost	
	Cases	Controls		Cases	Controls
<b>All</b>	2626	2626		2626	2626
	↓ 14%	↓ 22%		↓ 14%	↓ 22%
<b>Admitted</b>	359	588		359	588
	↓ 90%	↓ 91%		↓ 90%	↓ 90%
<b>Located &amp; Costed</b>	322	537		324	530
	↓ @£890	↓ @£1,391		↓ @£1,049	↓ @£1,615
<b>Cost</b>	286,573	746,998		339,912	855,847
	↓ ÷0.90	↓ ÷0.91		↓ ÷0.90	↓ ÷0.90
<b>Grossed -Up Cost</b>	319,502	817,942		376,631	949,505
	↘	↘		↘	↘
<b>Difference</b>	<b>-498,440</b>			<b>-572,875</b>	

# A&E Activity Outcomes – Concurrent Controls

Outcome	Cases	Controls	Difference (95% CI)	Notes
Admission from A&E	13.7%	22.4%	8.7% (6.8% - 10.6%)	Sig. at 99%
Average Duration in A&E	4h 20m	2h 43m	97m (83m – 111m)	Sig. at 99%
Average Number of Re-attendances within 28 days*	1.14	0.64	0.50 (0.40 to 0.61)	Sig. at 99%
Average Number of Re-attendances within 90 days*	2.20	1.53	0.67 (0.57 to 0.78)	Sig. at 99%

*\* Applies to subset of cases seen between July 2012 and November 2012*

# Inpatient Activity Outcomes – Concurrent Controls

Outcome	Cases	Controls	Difference (95% CI)	Notes
Average Length of Stay Days	5.7	6.3	0.6 (0.5 to 0.7)	Sig. at 99%
Average Number of Re- admissions within 28 days*	0.28	0.31	-0.03 (-0.01 to -0.05)	Sig. at 99%
Average Number of Re- admissions within 90 days*	0.80	0.72	0.08 (0.04 to 0.13)	Sig. at 99%

*\* Applies to subset of cases seen between July 2012 and November 2012.*



# Inpatient Financial Outcomes – Concurrent Controls

	Commissioner Cost			Provider Cost	
	Cases	Controls		Cases	Controls
<b>All*</b>	33,750	33,750		33,750	33,750
	↓ 93.1%	↓ 93.1%		↓ 93.1%	↓ 93.1%
<b>Matched</b>	31,414	31,414		31,414	31,414
	↓ 99.0%	↓ 99.0%		↓ 99.6%	↓ 99.6%
<b>Located &amp; Costed</b>	31,093	31,093		31,296	31,296
	↓ @£1,629	↓ @£1,678		↓ @£2,080	↓ @£2,238
<b>Cost</b>	50,656,320	52,162,644		65,110,245	70,042,352
	↘	↘		↘	↘
<b>Difference</b>	1,506,323			4,923,107	
		↓ ÷ 0.990 ÷ 0.931			↓ ÷ 0.996 ÷ 0.931
<b>Grossed-Up Difference</b>	1,635,107			5,318,846	

\* To avoid double counting, this number excludes cases seen by RAID in AE and then admitted

# Financial Outcomes Summary – Concurrent Controls

		Full Tariff / Average Cost (£'000s)			Savings Share	Marginal (£'000s)
		A&E	Inpatient	Grossed-Up Total*		
Commissioner	Saving	498	1,635	2,133	36%	640
Provider	Spend	-573	-5,319	-5,892		
	Income	-498	-1,635	-2,133		
	Saving	74	3,684	3,758	64%	1,127
Total Saving				5,892		1,768
Full Costs				3,295		
Incremental Cost				1,976		
Saving / Incremental Cost				2.98		0.89

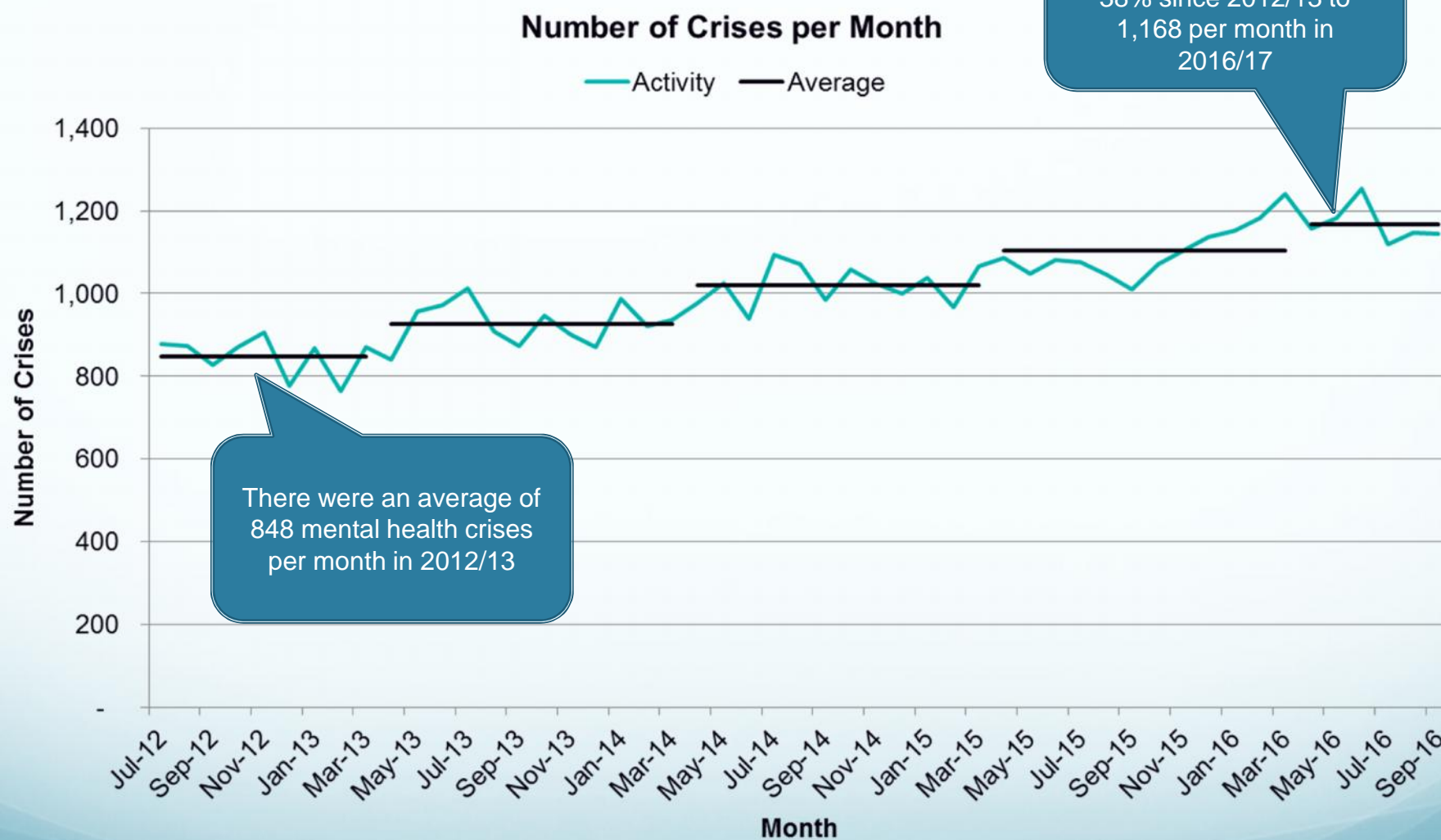
# Activity Outcomes by Site

Site		Admission via A&E				Length of Stay		
		<i>cases</i>	<i>controls</i>	<i>diff</i>		<i>cases</i>	<i>controls</i>	<i>diff</i>
Heartlands		14.3%	28.7%	-14.4%		6.1	7.4	-1.3
Good Hope		19.4%	29.2%	-9.8%		7.2	7.7	-0.5
Solihull		20.2%	11.2%	+9.0%		5.2	5.8	-0.6
City		11.4%	17.3%	-5.9%		3.9	4.6	-0.7
UHB		10.9%	19.1%	-8.2%		6.3	6.3	0.0
All		13.7%	22.4%	-8.7%		5.7	6.3	-0.6

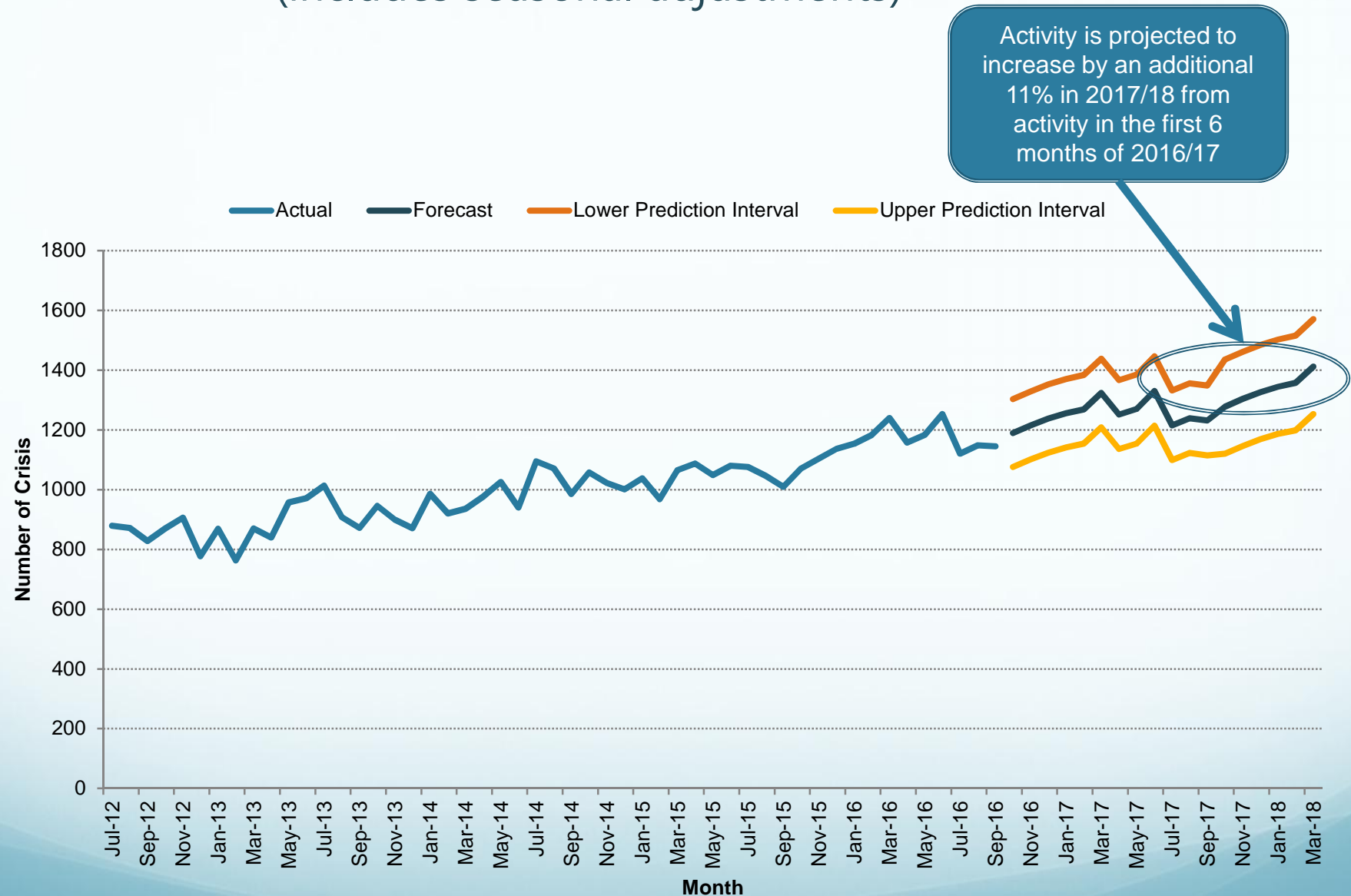
## Financial Outcomes by Site (£'000s)

	All	HoEFT	City	UHB
Full Cost	3,295	1,748	748	798
Incremental Cost	1,976	997	465	513
Commissioner Savings AE	-498	-322	-109	-69
Provider Savings AE	-74	-31	26	-80
Commissioner Savings IP	-1,635	-1,494	-293	162
Provider Savings IP	-3,684	-3,161	-1,028	535
Total Savings	-5,892	-5,008	-1,404	549
Net Savings (@ full cost)	-2,597	-3,261	-656	1,347
Net Savings (@ incremental cost)	-3,916	-4,011	-939	1,062
Savings / Full Cost	1.79	2.87	1.88	-0.69
Savings / Incremental Cost	2.98	5.02	3.02	-1.07

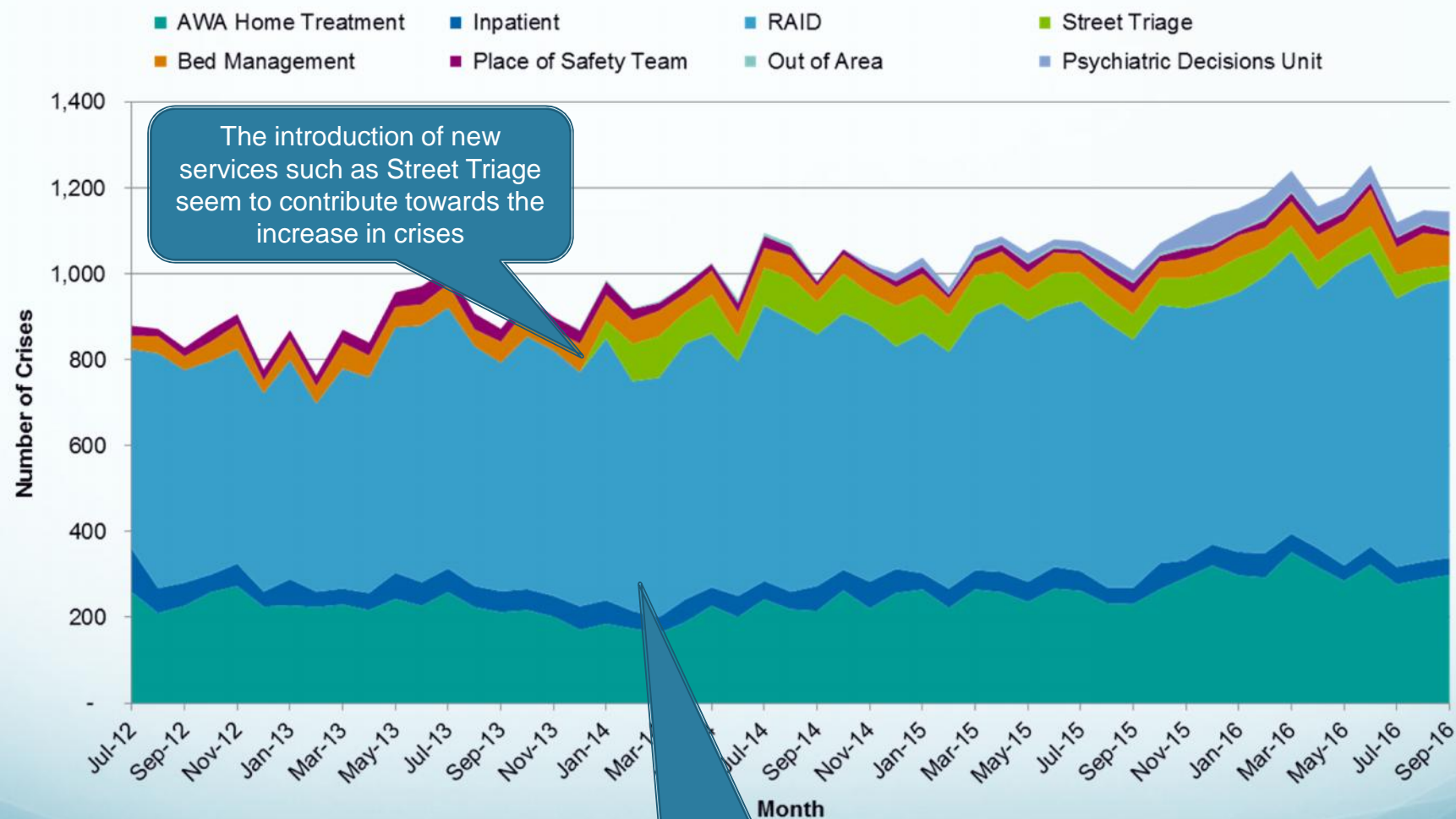
# There is an increasing number of crises



# Crises are likely to increase in the future if nothing changes (includes seasonal adjustments)

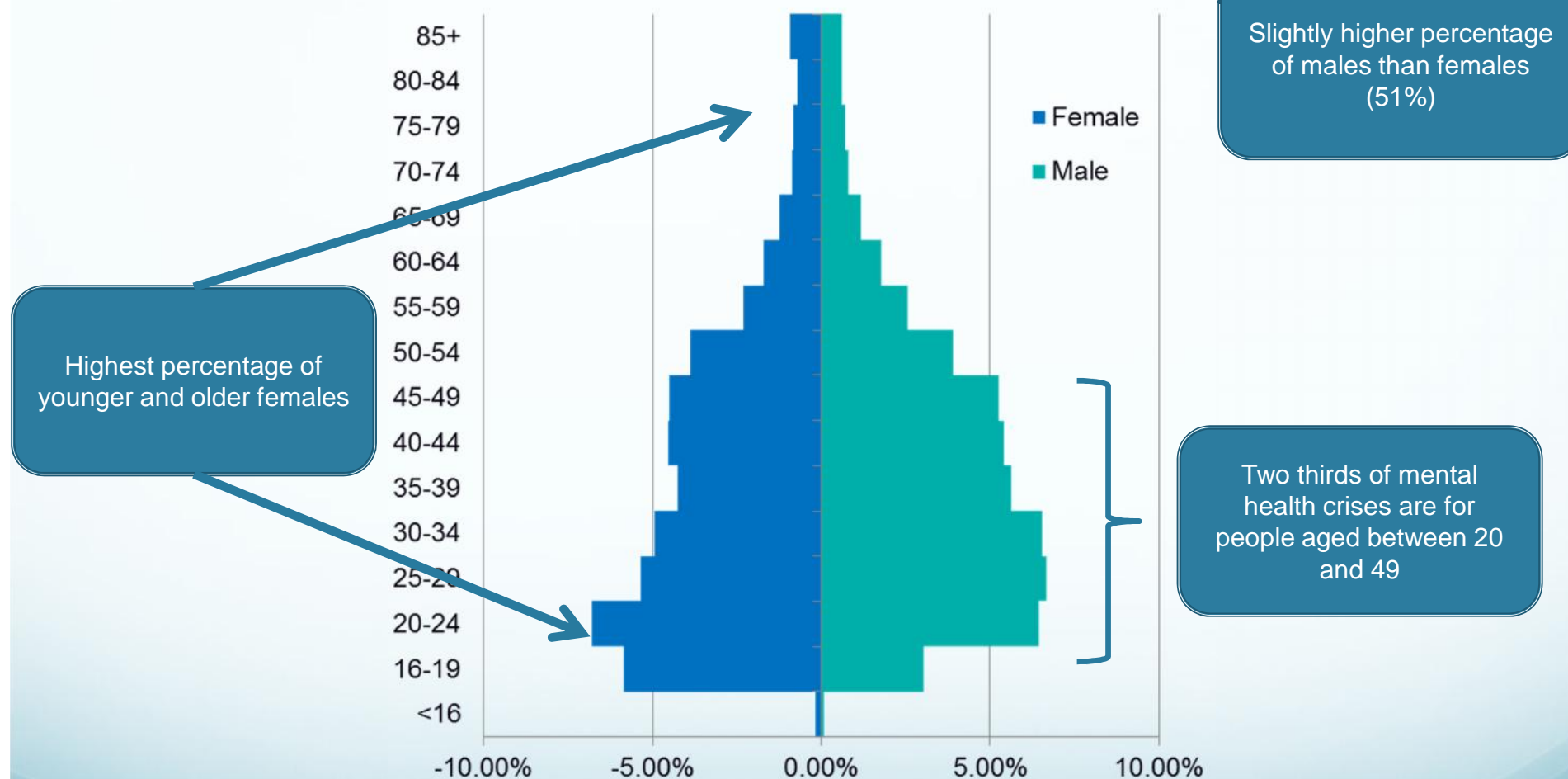


# Where do patients present when they are in crisis?



More than half of mental crises presented via A&E and were seen by the RAID Team

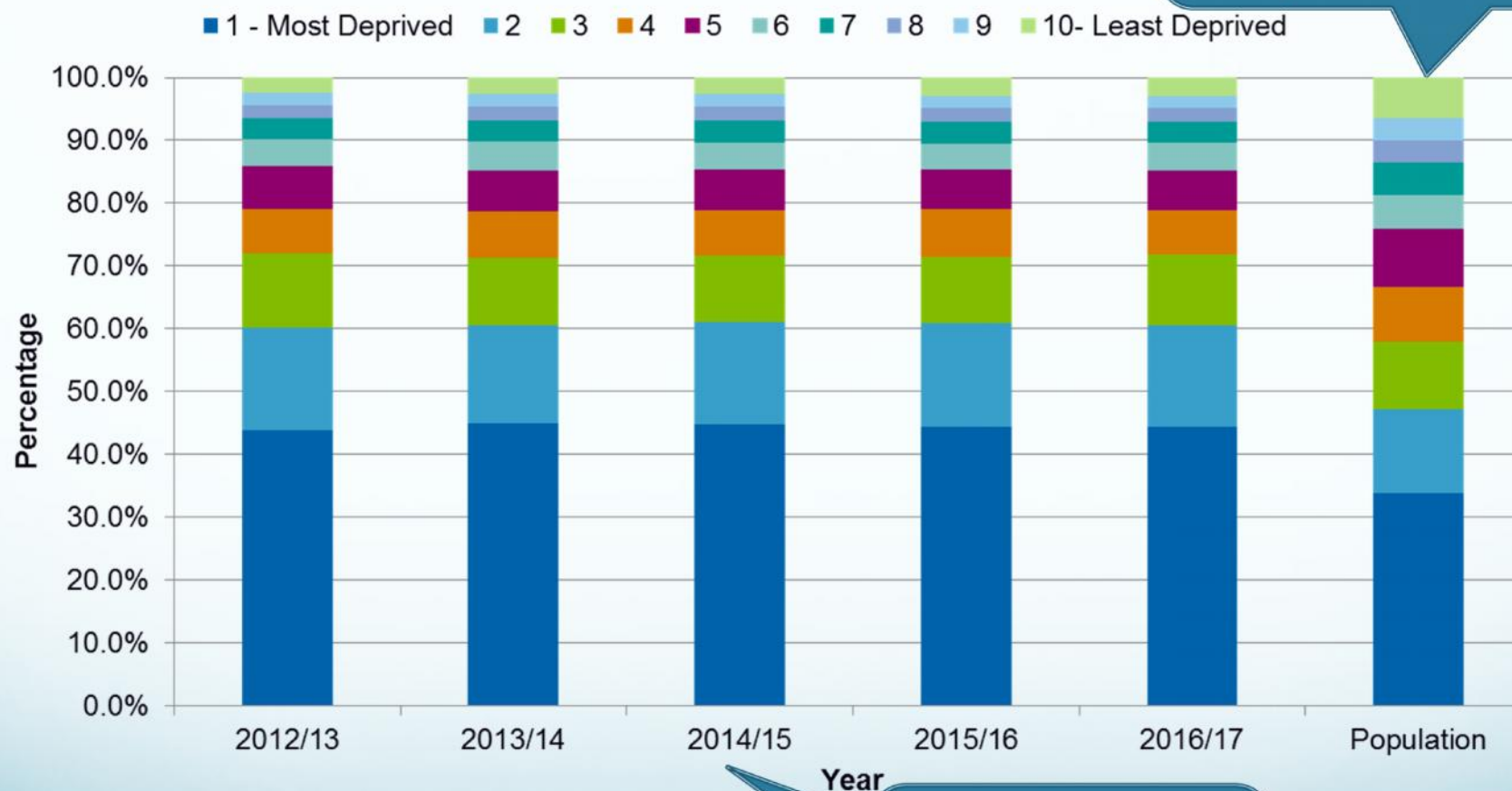
# What is the age / gender profile of patients in crisis?





# Are patients in crisis more deprived than the background population?

People with a mental health crisis live in more deprived areas than the general population of Birmingham and Solihull

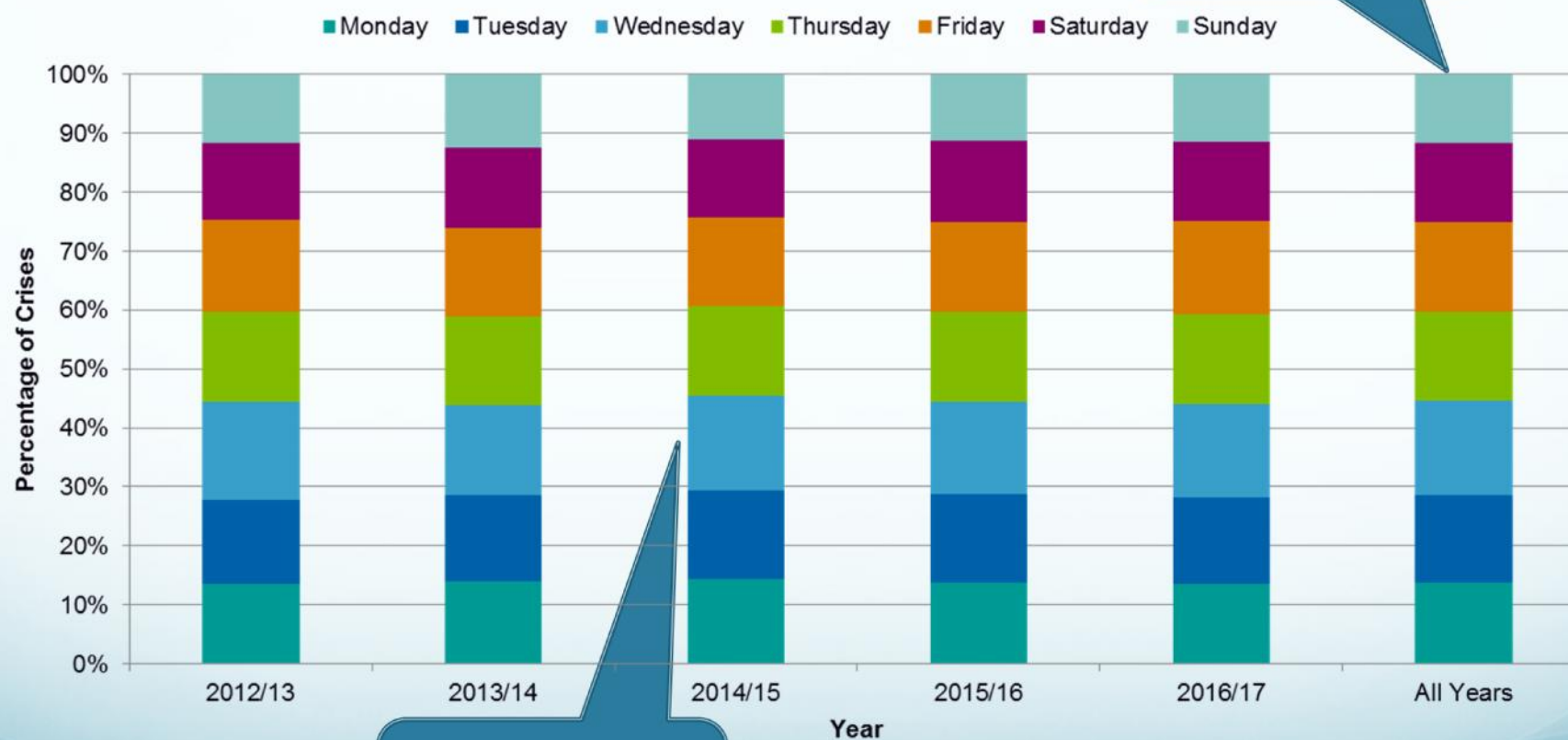


The deprivation profile each year for people who have a mental health crisis has not changed significantly over the years

# On which day of the week do patients in crisis present?

The number of crises that present on each day of the week are broadly similar but there are some marginal differences

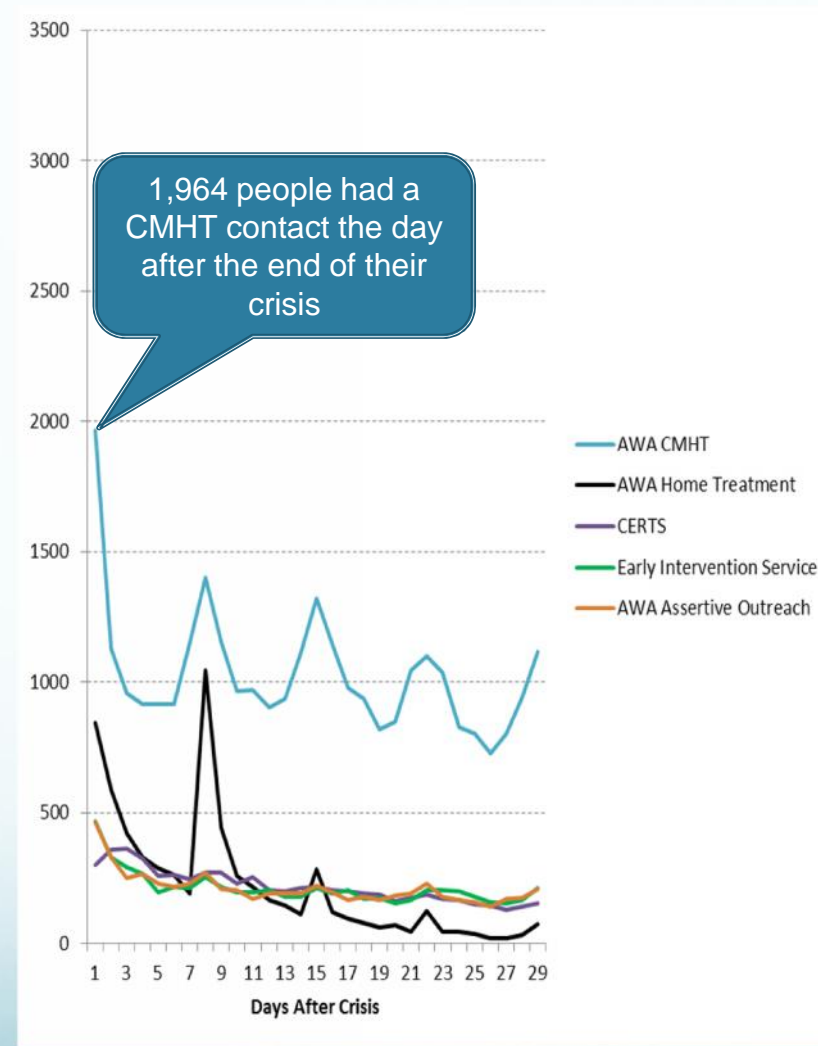
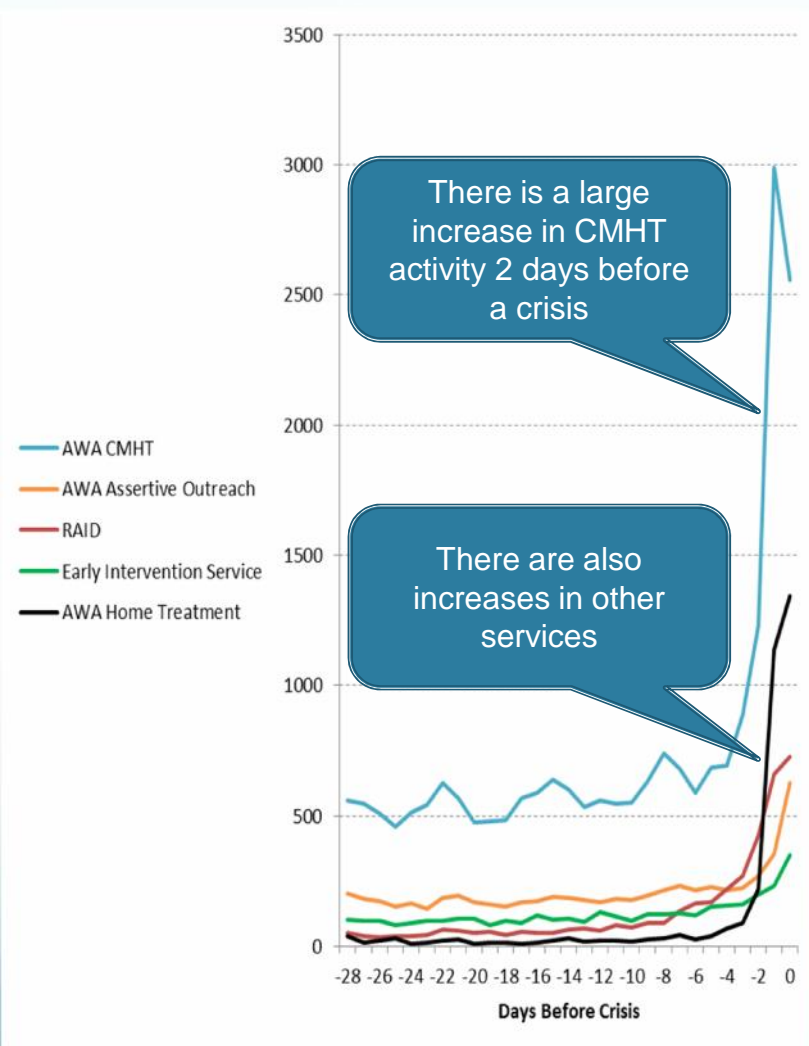
Sundays have the lowest level of mental health crises



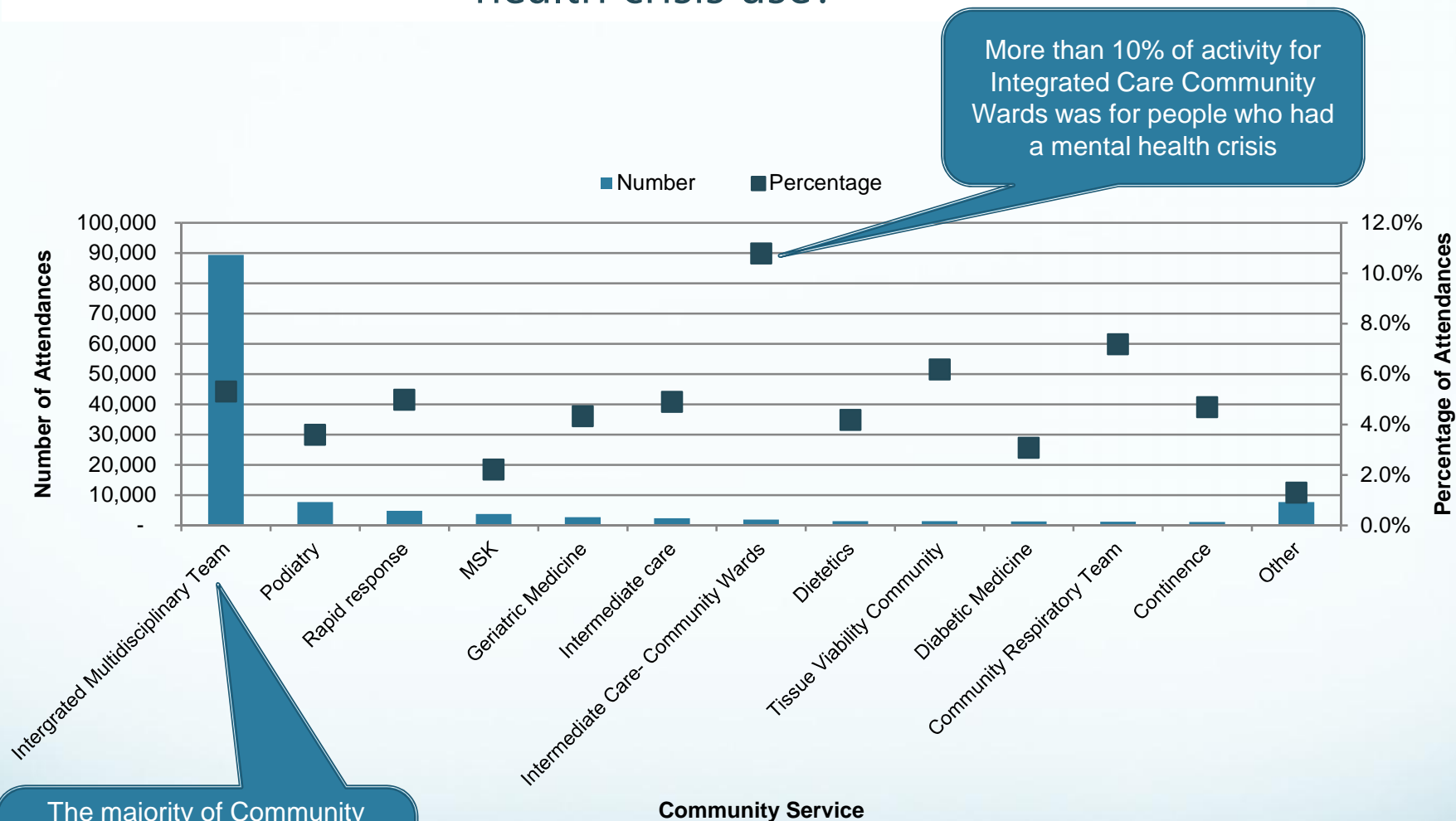
Wednesdays have the highest level of mental health crises

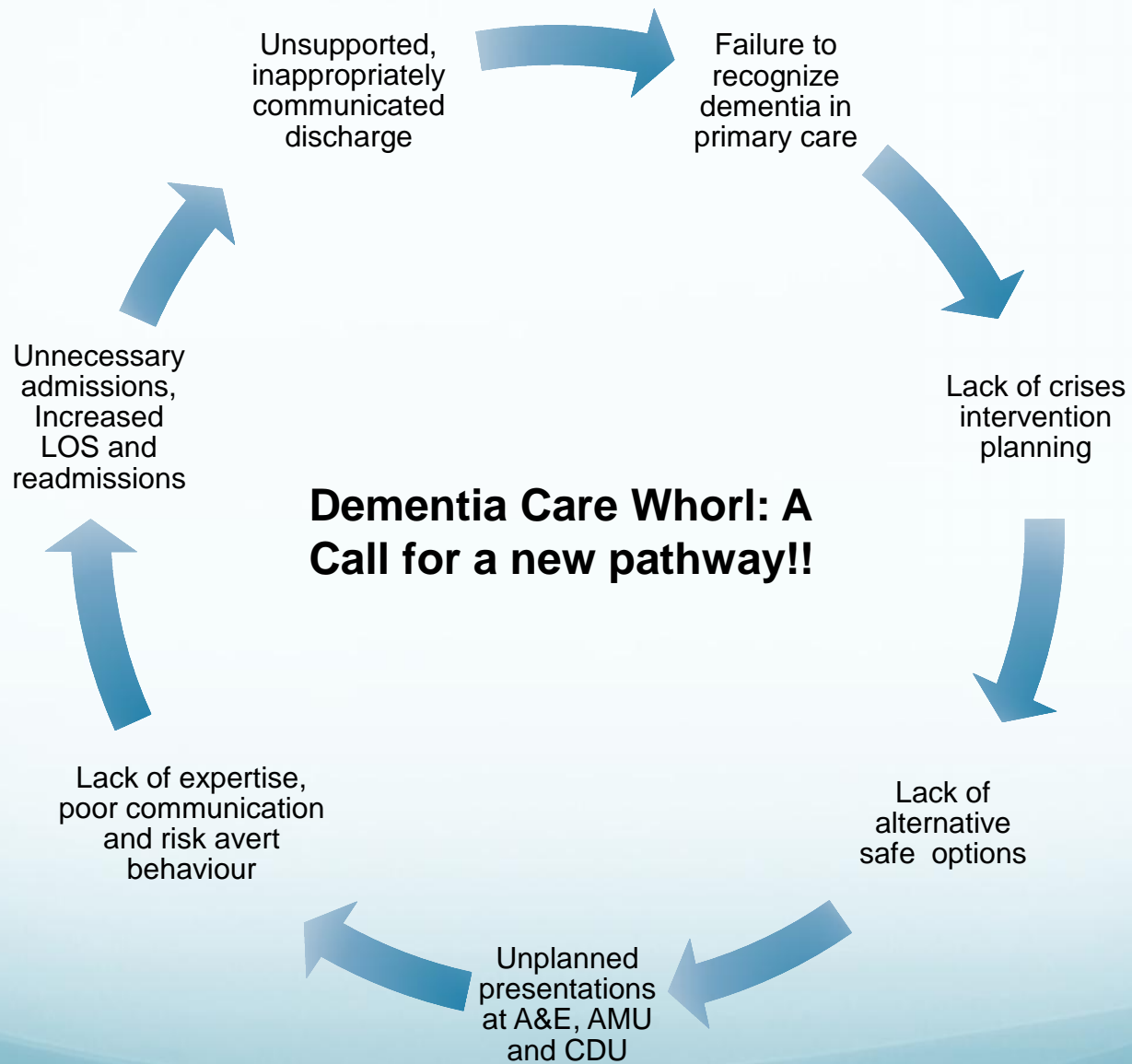


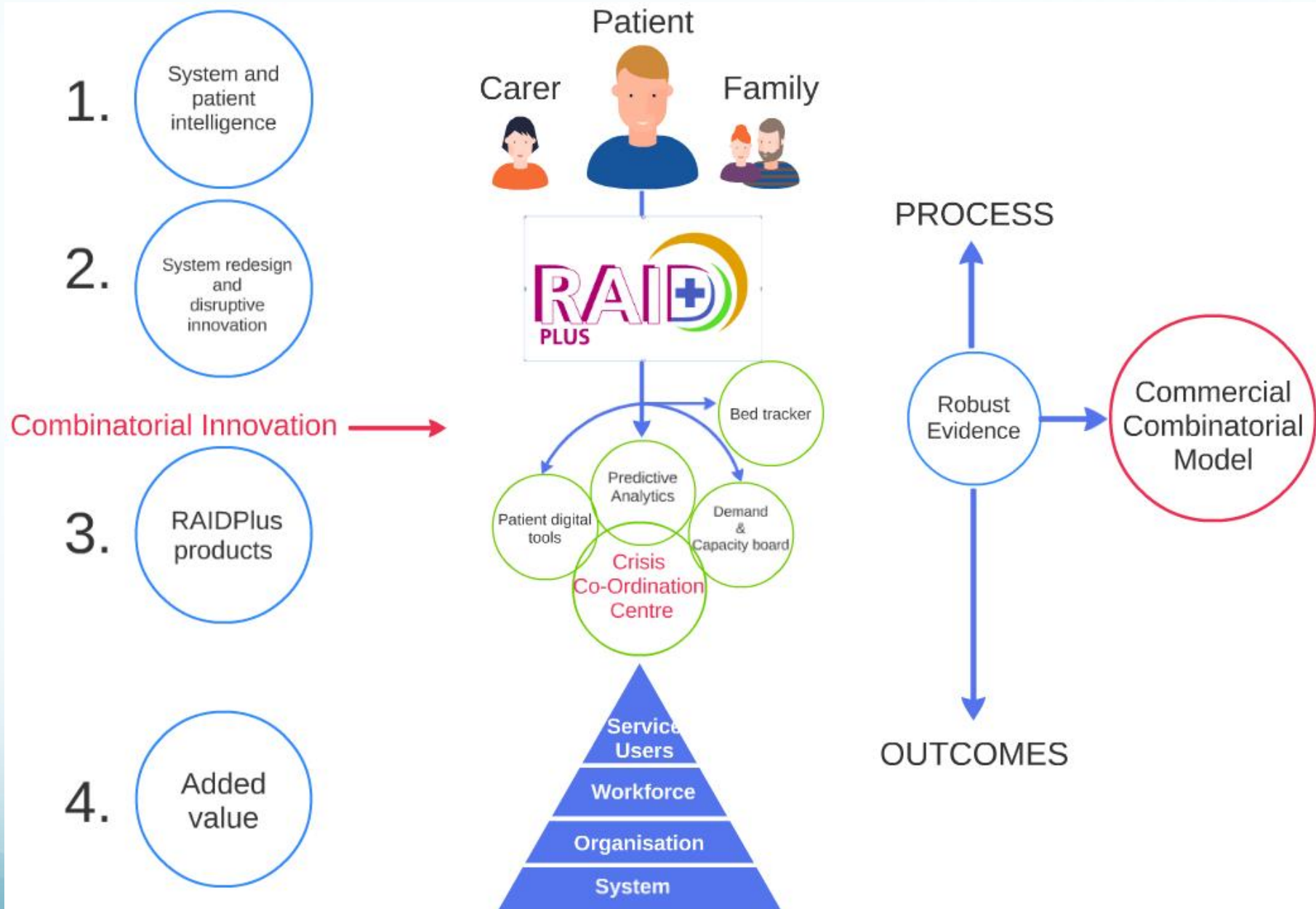
# Pathways in and out of crisis (28 days)



# Which community services do people who have a mental health crisis use?







# Third sector partnership

## ◆ Alzheimer's Society

- ◆ Free support to a weekly memory clinic.
- ◆ Free access information and carers support weekly.
- ◆ Alz café
- ◆ Carers and patients voice.

## ◆ Volunteers' service

- ◆ A good numbers of volunteers
- ◆ Properly governed
- ◆ Very useful

## ◆ Charities

- ◆ Research
- ◆ Training
- ◆ Support

Leading the fight  
against dementia

Alzheimer's  
Society



# Reminiscence Pod

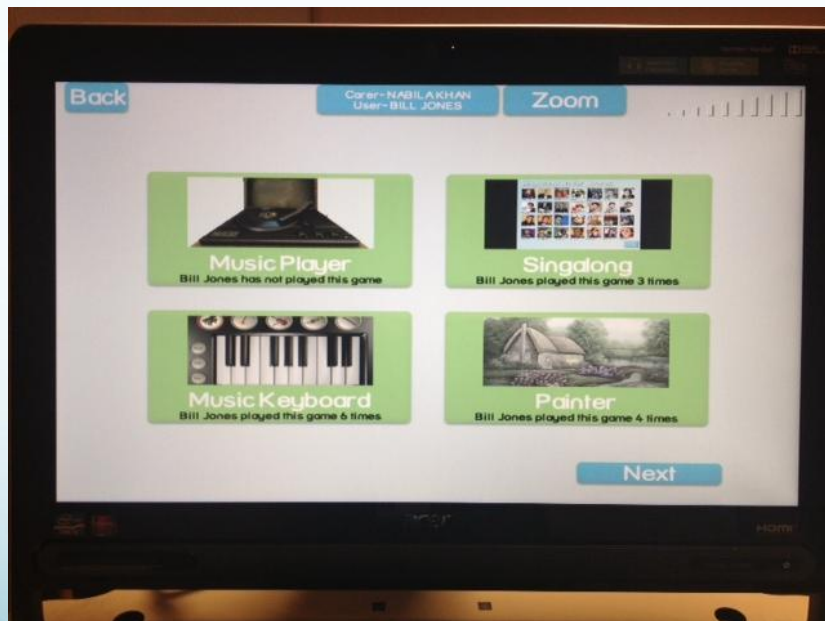
Pop Up Vintage Store



1950's Pop Up Living Room



# My Life Software



- Touch screen computer on wheels
- Activities
  - Games
  - Music Player
  - Sing-a-long
  - Painter
  - Bingo
  - Quiz
- Reminiscence media
  - Different media types
    - Video Clips
    - Music Clips
    - Photos
  - For different categories
    - Sport
    - People and Occasions
    - Entertainment and Humour
    - Youth
    - Pastimes
  - Individual favourites

# Dementia Care in Acute Hospitals: An E-learning training package

## E-learning Development

- Funding provided by the Academic Health Science Network (AHSN).
- E-learning module aimed at acute hospital staff who are caring for people with dementia.
- The module content was provided by experts in the field and produced by the company GuyKat, a Birmingham based e-learning developer.
- On going pilot
- The finished module will be accredited by the University of Chester.

Brought to you by

Birmingham and Solihull  
Mental Health NHS Foundation Trust



- Many languages
- No specific training
- <http://www.mocatest.org/paper-tests/moca-test-full/h>

Author's address: [marco@cs.cmu.edu](mailto:marco@cs.cmu.edu)

# ACE III

- [http://dementia.ie/images/uploads/site-images/ACE-III\\_Administration\\_\(UK\).pdf](http://dementia.ie/images/uploads/site-images/ACE-III_Administration_(UK).pdf)

ADDENBROOKE'S COGNITIVE EXAMINATION – ACE-III English Version A (2012)																									
Name: _____				Date of testing: ____/____/____																					
Date of Birth: _____				Tester's name: _____																					
Hospital No. or Address: _____				Age at leaving full-time education: _____																					
				Occupation: _____																					
				Handedness: _____																					
<b>ATTENTION</b>																									
> Ask: What is the	Day	Date	Month	Year	Season	Attention (Score 0-5)																			
> Ask: Which	No./Floor	Street/Hospital	Town	County	Country	Attention (Score 0-5)																			
<b>ATTENTION</b>																									
> Tell: "I'm going to give you three words and I'd like you to repeat them after me: lemon, key and ball." After subject repeats, say "Try to remember them because I'm going to ask you later".						Attention (Score 0-3)																			
> Score <i>only</i> the first trial (repeat 3 times if necessary).																									
> Register number of trials: _____																									
<b>ATTENTION</b>																									
> Ask the subject: "Could you take 7 away from 100? I'd like you to keep taking 7 away from each new number until I tell you to stop."						Attention (Score 0-5)																			
> If subject makes a mistake, do not stop them. Let the subject carry on and check subsequent answers (e.g., 93, 84, 77, 70, 63 – score 4).																									
> Stop after five subtractions (93, 86, 79, 72, 65): _____																									
<b>MEMORY</b>																									
> Ask: 'Which 3 words did I ask you to repeat and remember?' _____						Memory (Score 0-3)																			
<b>FLUENCY</b>																									
> <b>Letters</b> Say: "I'm going to give you a letter of the alphabet and I'd like you to generate as many words as you can beginning with that letter, but not names of people or places. For example, if I give you the letter "C", you could give me words like "cat, cry, clock" and so on. But, you can't give me words like Catherine or Canada. Do you understand? Are you ready? You have one minute. The letter I want you to use is the letter "P".						Fluency (Score 0 – 7)																			
						<table border="1"> <tr><td>≥ 18</td><td>7</td></tr> <tr><td>14-17</td><td>6</td></tr> <tr><td>11-13</td><td>5</td></tr> <tr><td>8-10</td><td>4</td></tr> <tr><td>6-7</td><td>3</td></tr> <tr><td>4-5</td><td>2</td></tr> <tr><td>2-3</td><td>1</td></tr> <tr><td>0-1</td><td>0</td></tr> <tr><td>total</td><td>correct</td></tr> </table>		≥ 18	7	14-17	6	11-13	5	8-10	4	6-7	3	4-5	2	2-3	1	0-1	0	total	correct
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> <b>Animals</b> Say: "Now can you name as many animals as possible. It can begin with any letter."						Fluency (Score 0 – 7)																			
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# DVLA guidance on driving with health conditions

- <https://www.gov.uk/health-conditions-and-driving>



Royal College  
of Nursing

Alzheimer's  
Society

Leading the  
fight against  
dementia

# This is me

This leaflet will help you support me  
in an unfamiliar place.

Please place a photograph of yourself in the space provided.

My full name

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Thank You