

# Characterising acute kidney injury using a linked clinical database

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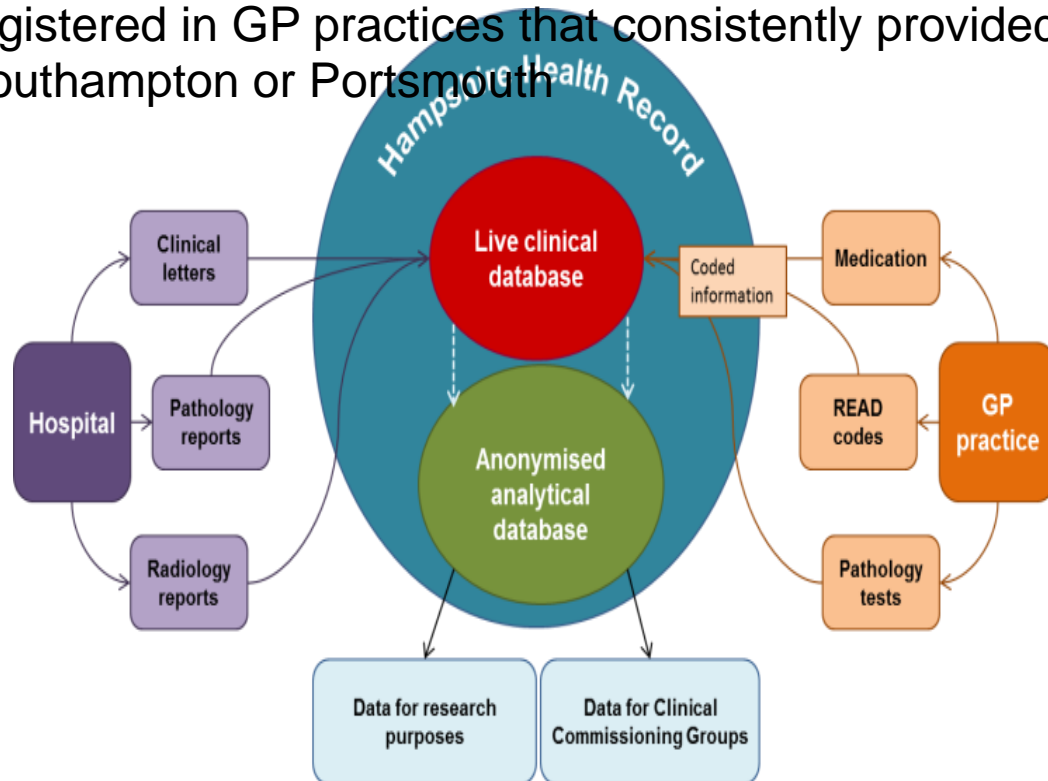
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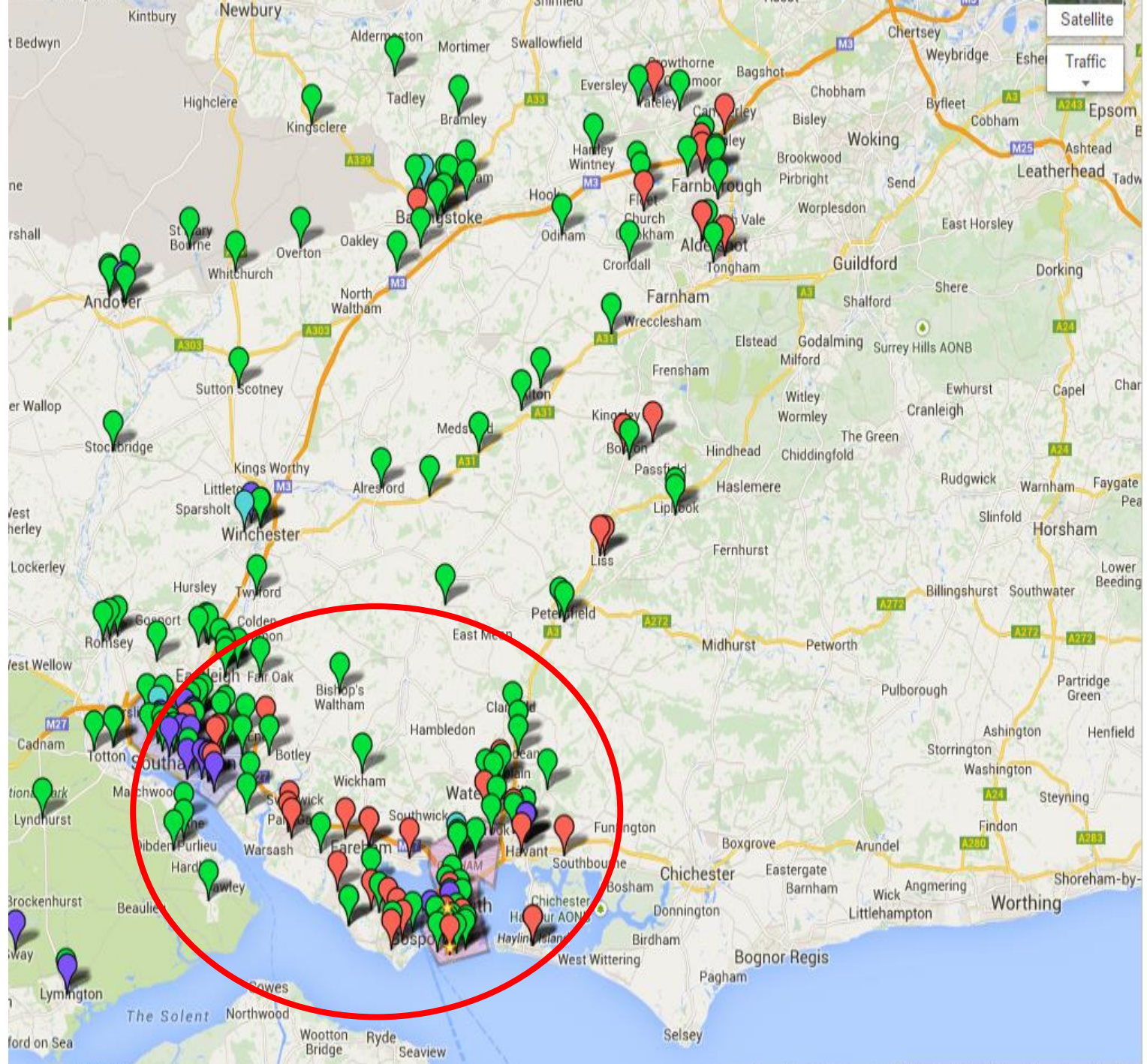
# Overall aims

- To reproduce NHS AKI e-alerts in a large linked clinical database
- To understand the epidemiology of AKI, particularly community-acquired AKI
- To explore differences in associations and outcomes of community-acquired AKI and hospital acquired AKI
- To inform clinical care for AKI

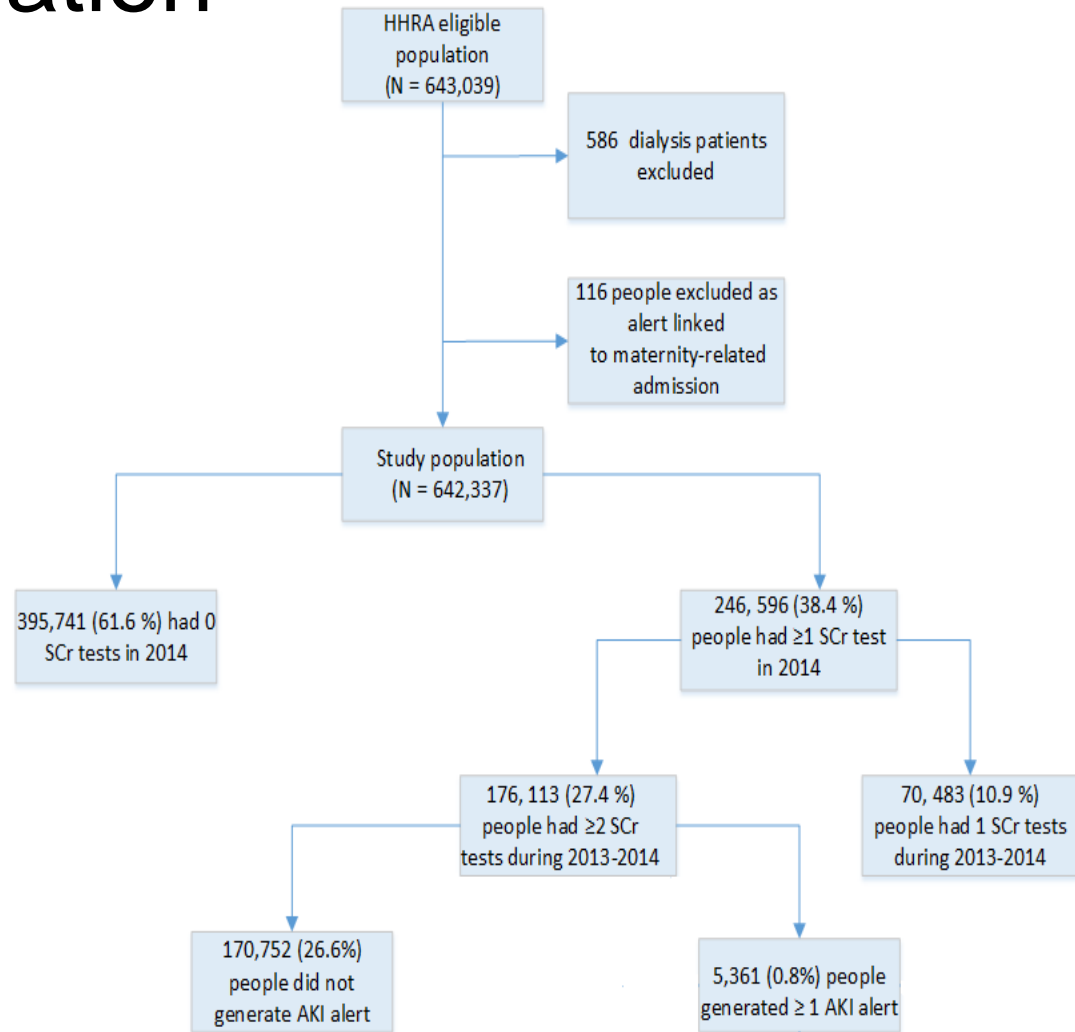
# Hampshire Health Record

- 'Live' clinical system with secondary analytical database
- Routine data from primary care and laboratories in Southampton & Portsmouth
- Population about 1.4 million, smaller for lab coverage (600k)
- >80% of GPs, once practice registered all historical patient information is available
- Our study population consisted of 643, 039 people who were registered in GP practices that consistently provided lab data to Southampton or Portsmouth

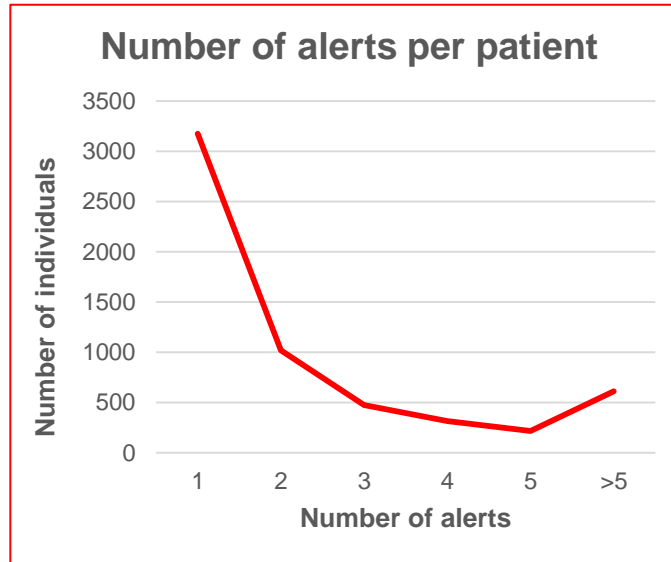




# Study population

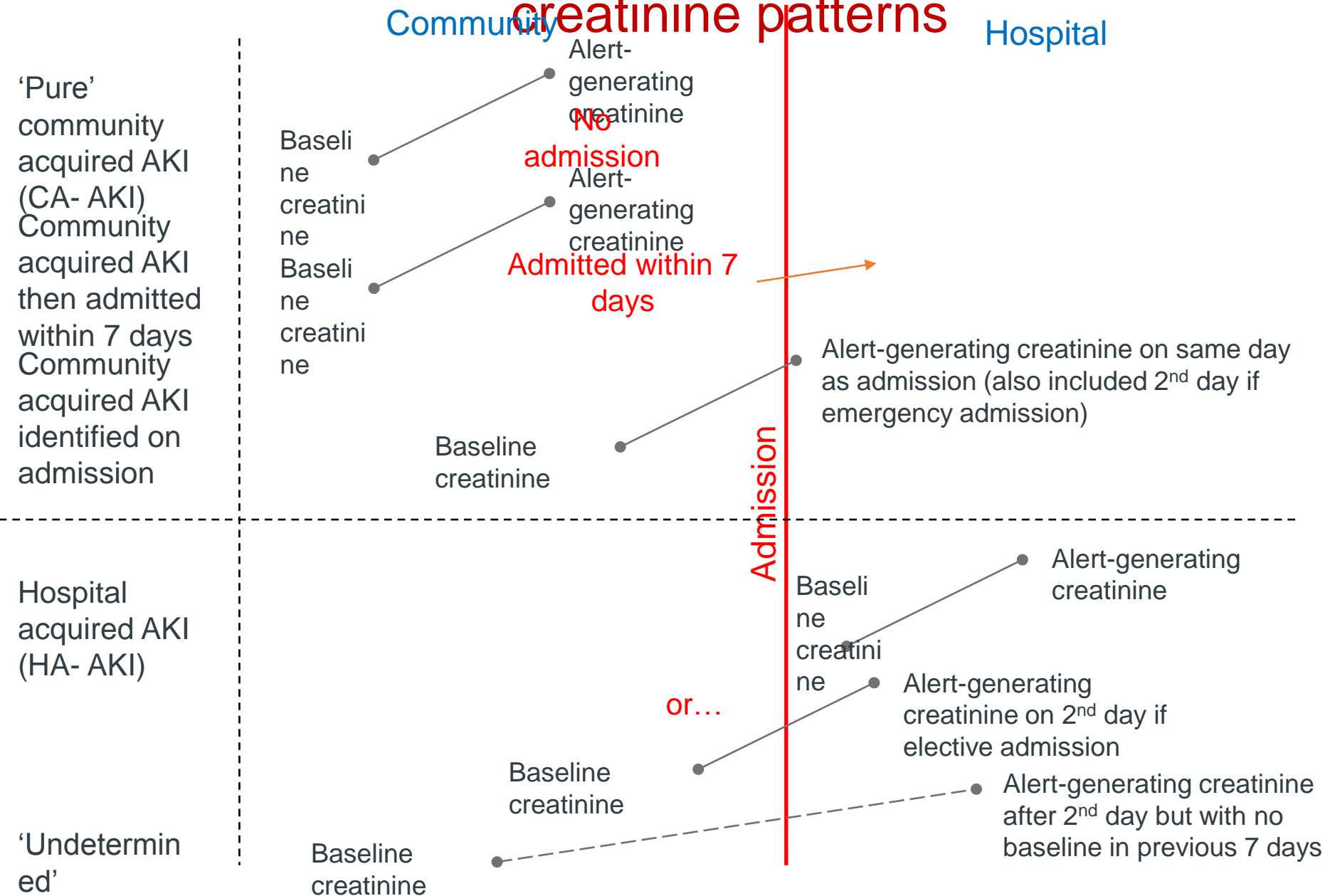


# Number of AKI alerts per person

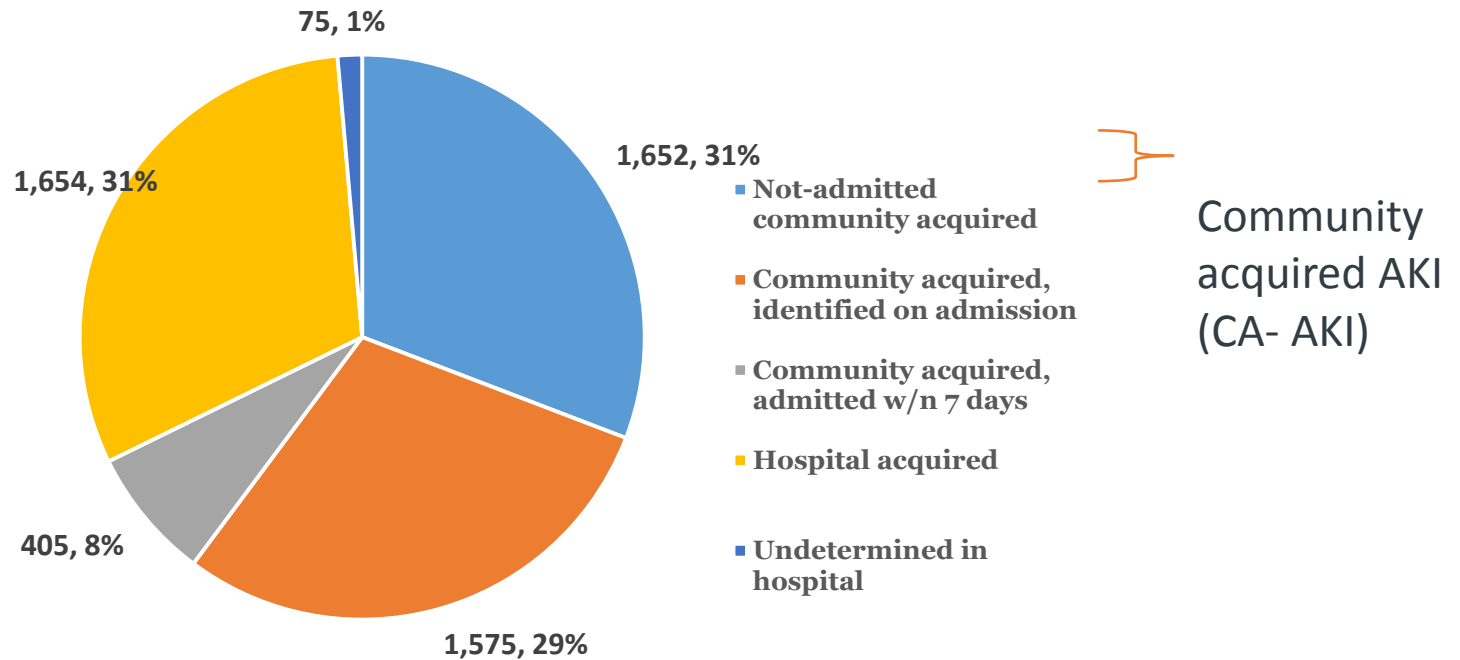


- Of those who generated  $\geq 1$  alert:
  - Most people (56%) generated one AKI alert
  - 18% generated 2 alerts, and 26% generated 3+ alerts

# AKI alert groups in relation to admission and creatinine patterns



# AKI alert groups in our cohort (based on first alert)





# Associations between patient characteristics and generating an AKI alert

	Unadjusted Associations	Adjusted* Associations
	OR (95% CI)	OR (95% CI)
Age	<b>1.07</b> (1.06 – 1.07)	<b>1.04</b> (1.04 -1.04)
Female	<b>1.23</b> (1.16 – 1.30)	<b>1.10</b> (1.04 -1.16)
Living in least deprived area (vs. most deprived)	<b>0.67</b> (0.61– 0.73)	<b>0.59</b> (0.53 – 0.64)
Has CKD	<b>8.92</b> (8.39 - 9.48 )	<b>1.68</b> (1.55 - 1.82)
Has hypertension	<b>5.74</b> (5.44 – 6.06)	<b>1.20</b> (1.11 - 1.29)
Has diabetes	<b>5.57</b> (5.24 – 5.91)	<b>2.14</b> (1.99 - 2.30)
Has heart failure	<b>13.12</b> (11.99 – 14.35)	<b>2.09</b> (1.86 – 2.34)
Has CVD	<b>7.60</b> (7.18 – 8.05)	<b>1.86</b> (1.73 – 2.01)
Prescribed diuretics	<b>8.27</b> (7.82 – 8.76)	<b>2.00</b> (1.86 - 2.14)
Prescribed RAASi	<b>4.16</b> (3.84 – 4.50)	<b>1.77</b> (1.37 - 2.28)
Prescribed NSAIDs	<b>3.66</b> (3.35 – 4.00)	<b>2.82</b> (2.59 – 3.11)

\*Adjusted for age, sex, Index of Multiple Deprivation, CKD, hypertension, diabetes, CVD (comprising ischaemic heart disease, cerebrovascular and peripheral vascular disease), prescribed diuretics, RAASi ,NSAIDs & interactions between RAASi and each chronic condition

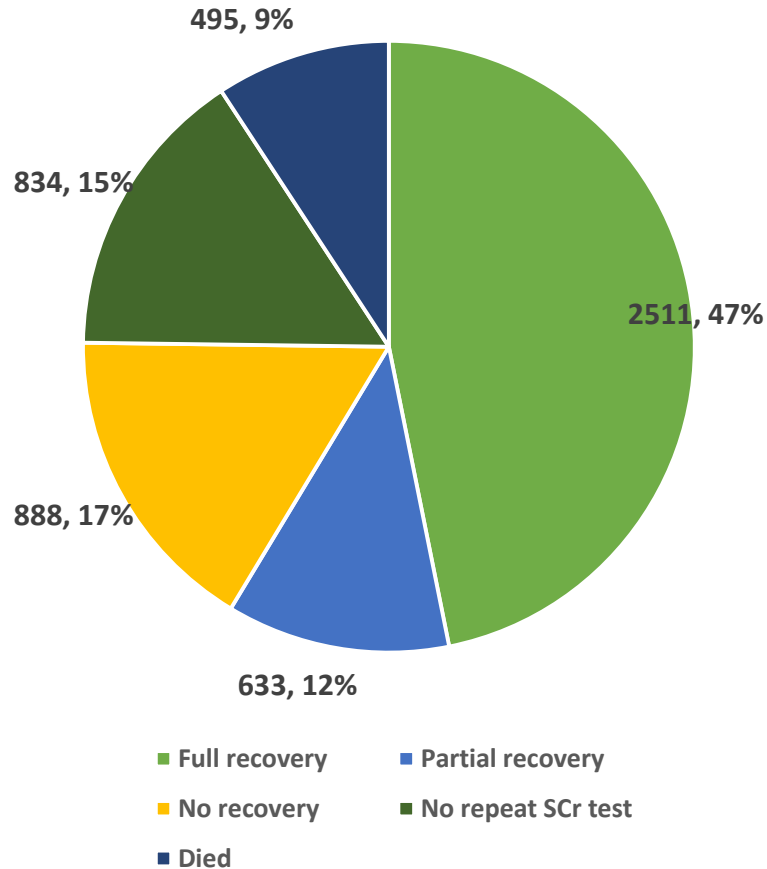
# Differences in associations by AKI group (based on first AKI alert)

	Not-admitted CA-AKI		Admitted CA-AKI		HA-AKI		Undetermined in hospital AKI	
	Adjusted OR	95% CI	Adjusted OR	95% CI	Adjusted OR	95% CI	Adjusted OR	95% CI
Age (years)	1.03	1.02-1.03	1.04	1.04-1.04	1.07	1.06-1.05	1.06	1.05-1.08
Female	1.50	1.35-1.66	0.92	0.84-1.01	0.99	0.89-1.09	0.94	0.67-1.31
Has hypertension	1.30	1.14-1.49	1.30	1.16-1.46	1.04	0.92-1.17	1.02	0.67-1.55
Has diabetes	2.31	2.03-2.63	2.20	1.92-2.47	1.83	1.61-2.08	1.71	1.08-2.69
Has chronic kidney disease	1.56	1.35-1.82	1.72	1.51-1.95	1.59	1.39-1.81	1.80	1.12-2.87
Has heart failure	1.91	1.55-2.36	2.17	1.82-2.58	1.80	1.48-2.17	1.76	0.84-3.68
Has cardiovascular disease	2.01	1.75-2.30	1.85	1.64-2.09	1.69	1.49-1.92	0.94	0.58-1.51
Prescribed diuretics	2.38	2.10-2.70	1.91	1.71-2.13	1.66	1.48-1.88	1.57	1.03-2.37
Prescribed RAASi	2.64	1.75-3.97	1.81	1.20-2.74	1.10	0.67-1.80	1.62	0.33-7.91
Prescribed NSAIDs	3.14	2.69-3.65	2.81	2.42-3.25	2.16	1.80-2.58	4.40	2.81-6.89
Least deprived Index of Multiple Deprivation (vs most deprived)	0.70	0.59-0.82	0.46	0.40-0.53	0.69	0.58-0.83	0.98	0.53-1.81

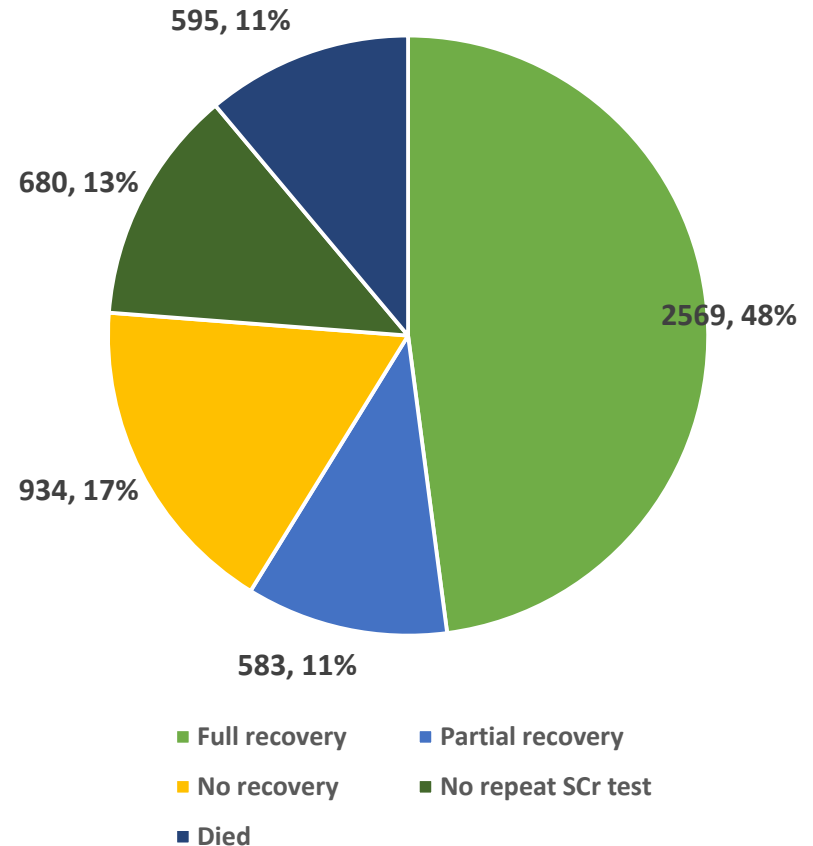
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# Creatinine recovery

AKI recovery within 90 days



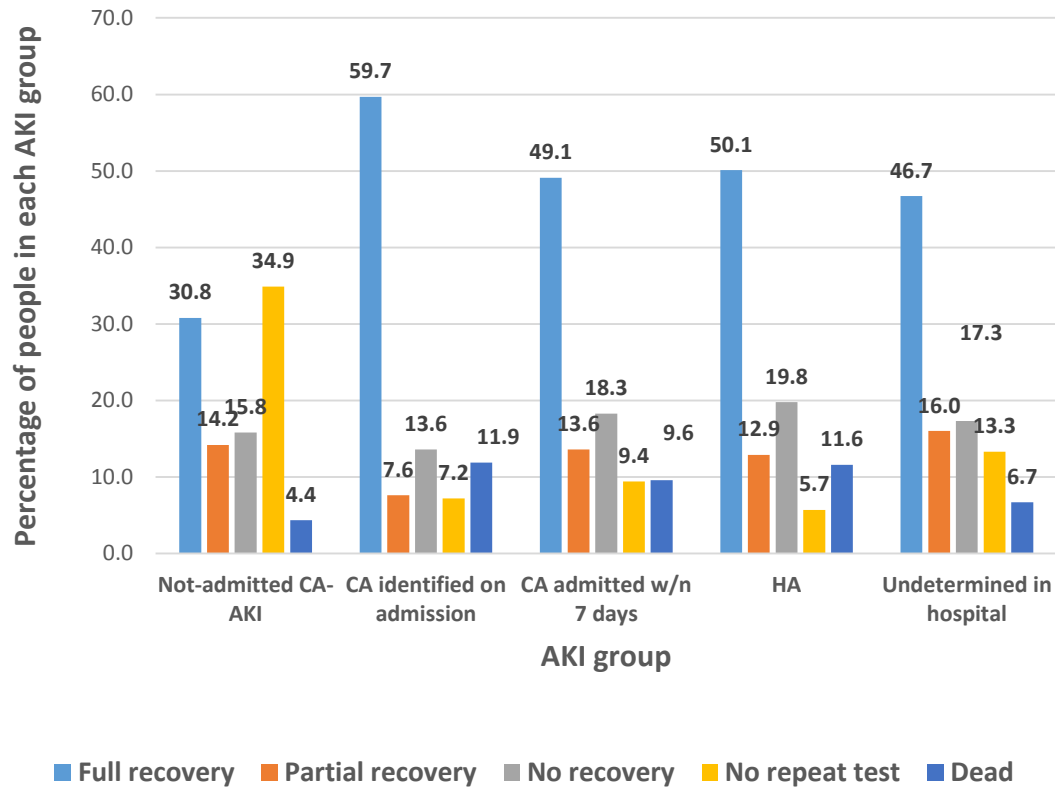
AKI recovery within 180 days



- Full recovery : creatinine returned to  $\leq 1.2$  x baseline creatinine at any time within 90 or 180 days
- Partial recovery: creatinine returned to  $>1.2$  and  $<1.5$  x baseline creatinine at any time within 90 or 180 days
- No recovery : creatinine remained  $\geq 1.5$  x baseline creatinine

# Creatinine recovery by AKI group

## Recovery status within 90 days



- Full recovery : creatinine returned to  $\leq 1.2$  x baseline creatinine at any time within 90 or 180 days
- Partial recovery: creatinine returned to  $\geq 1.2$  and  $< 1.5$  x baseline creatinine at any time within 90 or 180 days
- No recovery : creatinine remained  $\geq 1.5$  x baseline creatinine

# Survival: 1 year post first AKI alert

AKI group	Adjusted OR (95% CI)
Not-admitted CA-AKI	(reference)
CA-AKI identified on admission	1.91 (1.55 – 2.34)
CA-AKI admitted w/n 7 days	1.83 (1.49 – 2.24)
HA-AKI	1.80 (1.46 – 2.22)
Undetermined in hospital AKI	1.01 (0.45 – 2.29)

- Adjusted for age, hypertension, diabetes, chronic kidney disease, heart failure, cardiovascular disease, index of multiple deprivation, AKI stage & AKI group

# Conclusion

- It is possible to reproduce AKI e-alerts in a large linked database
- Most AKI originates in the community and a significant proportion (31% of all AKI) is not-admitted, some of whom do not fully recover
- We identified the characteristics of individuals at increased risk of CA-AKI in primary care who may benefit from monitoring of blood tests and possibly medication review.
- The study highlights the scope of NHS AKI e-alerts to improve outcomes & costs associated with AKI

# Acknowledgement

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# Questions?

