

## **Preventable Emergency Hospital Admissions among Adults with Intellectual Disability: comparisons with the general population in England**

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Footnote: Prior to writing this paper Dr Shah passed away. His co-authors would like to pay tribute to him, who as the principal investigator on this study successfully led it from inception.

### **Support:**

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## **Preventable Emergency Hospital Admissions among Adults with Intellectual Disability: comparisons with the general population in England**

### **Purpose**

Adults with intellectual disabilities (ID) experience poorer physical health and healthcare quality, but there is limited information on the scope for reducing emergency hospital admissions. We describe overall and preventable emergency admissions for adults with ID compared to the general population and assess differences in primary care management before admission for two common Ambulatory Care Sensitive conditions (ACSCs).

### **Methods**

We used electronic records to study a matched cohort of 16,666 adults with ID and 113,562 age, sex and practice matched controls from 343 English family practices. Incident rate ratios (IRR) from conditional Poisson regression are analysed for all emergency and preventable (ACSC) emergency admissions. Primary care management of lower respiratory (LRTI) and urinary tract (UTI) infections, as exemplar ACSCs, prior to admission are compared in unmatched analysis between adults with and without ID.

### **Results**

The overall rate for emergency admissions for adults with ID versus controls was 182 vs. 68 per 1000/year (IRR=2.82, 95%CI: 2.66–2.98). ACSCs accounted for 33.7% of emergency admissions compared to 17.3% in controls (IRR=5.62, 5.14-6.13); adjusting for comorbidity, smoking and deprivation did not explain the difference (IRR=3.60, 3.25–3.99). Despite adults with ID being at nearly five times higher risk for admissions from LRTI and UTI, they have

similar primary care utilisation, investigation and management preceding admission, as the general population.

### **Conclusion**

Adults with ID are at high risk of preventable emergency admissions. Identifying improvements for detection and management of ACSCs in primary care, including lower respiratory and urinary tract infections, could reduce hospitalisations.

**Abstract word count:** 250 words

**Keywords:** Intellectual disability, acute hospitalisation, ambulatory care sensitive conditions

**Abbreviations:** All are defined within the main text.

## Introduction

Adults with intellectual disabilities (ID) experience poorer health outcomes than their general population peers and have higher levels of morbidity and mortality<sup>1</sup>. They also receive poorer quality healthcare for a range of reasons including discrimination, communication difficulties and access<sup>2</sup>. However, despite international recommendations<sup>2,3</sup>, this group remains largely invisible to routine data collection and analysis<sup>4</sup>. Acute hospitalisation is highly undesirable for this group and reducing preventable admissions is particularly important.

Ambulatory care sensitive conditions (ACSCs) are those for which prevention or effective management in primary care should decrease the risk of acute hospitalisation and are widely used as an indicator of access to, and quality of, primary care<sup>5-7</sup>. Studies of admissions for ACSCs in people with ID show consistently higher rates, however one relied solely on recording of ID during hospitalisation, which is incomplete<sup>8</sup> and others do not distinguish between acute and planned admissions, thereby including planned admissions that are not preventable in primary care<sup>9</sup>.

We used linkage of primary care records with hospital admission data in England for a large unselected group of adults with ID during 2009-13 compared to the general population. We report on overall emergency (acute) admission rates and those for only ACSCs. For two common ACSCs (urinary tract infections (UTI) and lower respiratory tract infections (LRTI)) which are increasing in the UK<sup>6</sup>, and for which adults with ID are at high risk, we examined

primary care records to describe whether pre-admission management in primary care differs from adults without ID.

## **Methods**

### *Study design and Setting*

We conducted a retrospective matched cohort study using the Clinical Practice Research Datalink (CPRD), a large representative UK primary care database, where the majority (>98%) of the population uses general (family) practices for primary care services<sup>10</sup>. Data is entered using Read codes, a hierarchical clinical classification system of approximately 100,000 codes<sup>11</sup>. We included 343 practices in England recording data on 1/1/2009 with anonymous linkage to hospitalisation data. This study (13\_094R) was approved by the Independent Scientific Advisory Committee evaluation of protocols of research involving CPRD data. The study sponsor (St George's, University of London) confirmed no further ethical review was required.

We have previously detailed methodology for identifying adults with ID using Read codes for ID and associated conditions<sup>12</sup>. Patients were assigned as living in a communal setting, from specific Read codes, or by  $\geq 3$  people with ID living at the same address. We classified ID patients as having high levels of support needs if they had a record of severe/profound ID or, where no record was available (59%), the occurrence of two or more of: cerebral palsy or significant mobility problem, severe visual impairment, severe hearing impairment, epilepsy, continence problem or use of percutaneous endoscopic gastrostomy feeding.

Patients were followed from the latest of 1/1/2009, January 1<sup>st</sup> of the year they turned 18, or registration date with the practice, until the earliest of: death, deregistration, when the practice stopped providing data, or study end (31/3/2013)<sup>13</sup>. Additionally, up to seven contemporary age-, sex- and practice- matched controls, were randomly selected from the remaining population without ID. The average length of follow up for all individuals was approximately 3 years (1,097 days).

### *Study Outcomes*

In the UK, every admission to an NHS (National Health Service) hospital is recorded in HES (Hospital Episodes Statistics), including information on the date, duration, type (e.g. emergency) and primary reason for admission (ICD-10 code). Although information is available regarding multiple episodes within each hospitalisation, we focused on the initial episode, as it reflects the primary reason for admission<sup>6</sup>.

We included 20 widely used ACSCs, but considered additional conditions relevant to the ID population<sup>8,14</sup> (constipation, aspiration, GERD, osteoporosis and schizophrenia). We chose not to use osteoporosis, since it is rarely recorded as the primary reason for admission, or schizophrenia, due to the idiosyncratic recording of elective vs. emergency for many English psychiatric admissions<sup>8</sup>. This resulted in 23 ACSCs (e-Table 1).

Due to the high number of admissions for LRTI and UTI, for both adults with and without ID, we use them as exemplar ACSCs to describe the primary care utilisation and management prior to admission. Although epilepsy is a larger contributor to ACSC admissions in adults

with ID due to high prevalence<sup>12</sup>, the low prevalence in adults without ID makes comparison difficult. For LRTI and UTI admissions we searched in the primary care record two weeks before admission to see if there were differences in primary care utilisation between adults with and without ID. Specifically, we sought whether patients had consulted their practice during normal operating hours or if they had an emergency encounter (Emergency room or other out-of-hours service). For those that consulted their practice we searched for a relevant diagnosis or antibiotic prescription, and whether a urine test had been performed for UTI admissions.

### *Statistical Analyses*

We present unadjusted and adjusted comparisons of admission rates between adults with and without ID, similar to a previous methodology comparing mortality rates between the groups<sup>13</sup>. The unadjusted comparisons already account for differences in the matched factors (age, sex, and practice), while the adjusted comparisons additionally adjust for baseline comorbidity, smoking and deprivation. For comorbidity, we used nine conditions which are independent predictors of mortality in the general population (atrial fibrillation, cancer, chronic obstructive pulmonary disease, dementia, diabetes, epilepsy, heart failure, severe mental illness, stroke)<sup>15</sup>. Deprivation was classified by using the Index of Multiple Deprivation, a composite small area ecological measure of deprivation based on postcode<sup>16</sup>. Incident rate ratios (IRR) for emergency hospitalisation were calculated using conditional Poisson models (Stata 12.0), stratified on match-sets, with an offset term for follow-up time. Negative binomial models accounting for overdispersion produced more conservative IRRs, but did not materially alter our conclusions (data not shown). The examination of primary

care utilisation preceding admission was unmatched; we used logistic regression to estimate an odds ratio for adults with ID vs. without ID, adjusting for age and sex.

For analyses of hospital admission rates, we tested for effect modification within the matched factors (age, sex) and important subgroups (Down syndrome, communal establishment, high support needs) we have identified previously<sup>13</sup>. For each subgroup comparison, we compared the IRR and confidence intervals derived from each distinct ID versus control comparison (e.g. ID adults with Down syndrome vs. controls) and calculated p-values for between-group differences. An alternative approach based on directly comparing ID adults (e.g. Down vs non-Down syndrome) produced identical conclusions (data not shown).

## **Results**

### *Emergency admissions*

Of the 16,666 adults with ID (mean age 39.9, 41.3% male), 3,847 (23.1%) had an emergency admission during follow-up, with 1,809 (10.9%) having multiple admissions. This contrasts with the age-sex-practice matched controls (n=113,562) of whom 11.9% had  $\geq 1$  emergency hospitalisation and 3.8% had multiple admissions. Of the 3,847 adults with ID admitted to hospital, only 2,525 (66%) had ID recorded in their hospital data.

The overall annual rate for emergency hospitalisations in adults with ID was 182 per 1,000 adults, representing a nearly three times increase (IRR=2.82, 95%CI: 2.66-2.98) compared to their matched controls (Table 1). This remains more than double (HR=2.16, 95%CI: 2.02-

2.30) when adjusted for comorbidities, smoking and deprivation. There was no effect modification by sex: while admission rates were higher for women with ID than men (204 vs. 167 per 1,000 adults/year), there was no difference ( $p=0.36$ ) relative to matched controls. The disparity for admissions between adults with ID and controls was more marked for older adults ( $\geq 35$  years). Higher admission rates were seen in ID adults with high support needs (244 per 1,000 adults/year), with the increased admission rate versus controls being higher than for ID adults without high support needs ( $P<0.001$ ). Rates of admission did not significantly vary by communal accommodation or by Down syndrome.

#### *Potentially preventable admissions*

Figure 1 summarises, by age, rates for all emergency admissions, and those for ACSCs only. Overall, admissions for ACSCs for adults with ID accounted for 33.7% of emergency admissions which remained constant across age groups. For adults without ID, 17.3% of emergency admissions were for ACSCs, however this proportion increased from 12% in the youngest to 24% in the oldest age-group.

Emergency admissions for ACSCs are summarised in Table 2. The overall rate for adults with ID was 61.3 per 1,000 adults compared to 11.7 for the controls (IRR=5.62, 95%CI: 5.14 – 6.13). The most common ACSCs resulting in admission for adults with ID were convulsions/epilepsy (35.6%), LRTI (18.6%) and UTI (11.4%), with the biggest relative disparities with controls seen for aspiration (IRR=86) and convulsions/epilepsy (IRR=31).

Emergency admissions for ACSCs by subgroup, both unadjusted and adjusted, are shown in Table 3. Adults with ID were over three times more likely to have an admission for an ACSC

even after their higher comorbidity was accounted for (IRR=3.60, 95%CI: 3.25–3.99). While the youngest group of ID adults (18-34 years) had admission rates over 7 times higher than controls, this effect modification was explained by adjustment for comorbidity. ID adults with high support needs were almost 12 times more likely to have an admission for an ACSC than their controls (IRR=11.78, 95%CI: 9.78-14.19) after adjustment for comorbidity; which represented difference between those without high support needs ( $p<0.001$ ). Similarly, there was effect modification in admission rates for ACSCs by Down syndrome ( $p=0.002$ ), with the higher rate among Down patients driven by a high proportion (31%) of ACSCs being for pneumonia/LRTI.

#### *Primary care utilisation before hospitalisation for common infections*

We compared the pattern of primary care utilisation in the 14 days before a UTI admission for 276 adults with ID and 451 without ID (Table 4). Patients with ID are more likely to be male (49% vs. 33%) and at a high risk of a UTI (50% vs. 26%). For both adults with and without ID 56% had a primary care consultation (OR=1.04, 95%CI: 0.77–1.40), with a further 7% each having an emergency encounter. For those that consulted, there was little difference between groups in the recording of UTI diagnosis, urine tests or antibiotic prescriptions.

For LRTI admissions ( $n=457$  adults with ID,  $n=671$  without ID) ID patients were more likely to be high risk of complications from infection (24% vs. 3%). The percentage of ID patients consulting with their practice in the two weeks before admission was marginally higher (61% vs. 55%, OR=1.26, 95%CI: 0.99-1.60), with a similar percentage (6%) having an emergency consultation elsewhere. Among those who consulted, the level of antibiotic prescribing and diagnosis recording was similar between groups.

## Discussion

We have detailed a more than doubling in emergency admissions for adults with ID compared to age-sex-practice matched controls, which is not explained by higher levels of comorbidity. Preventable admissions, for ACSCs, are five times more common in adults with ID. While the higher prevalence of epilepsy accounts for some of this difference, analysis adjusted for overall comorbidity still estimated a greater than three times higher rate. Despite this higher risk of preventable admissions, we failed to detect any notable differences, in the primary care utilisation and management before admissions, for two common ACSCs, urinary tract and lower respiratory tract infections.

### *Strengths and limitations*

Our study expands a limited area of research into acute hospitalisation of adults with ID<sup>17</sup>. The main strength of our study is its foundation in a large unselected primary care population of adults with ID, and age-sex-practice matched individuals without ID. This matching effectively accounts for any differences in regional access to healthcare and quality or inconsistencies in clinical recording. The linkage our study uses between primary care and hospital data has been called for<sup>8,18</sup> and allows information from both sources to enhance each other.

The main limitation of our study is the potential for incomplete (e.g. urine dipstick sticks) or inaccurate recording (in a few instances ID was erroneously coded as the reason for admission) We also have limited ability to examine epilepsy management, since epilepsy

drug and dose changes are mostly initiated and managed in England by non-primary care specialists. Our comparison of primary care utilisation prior to hospitalisation for two common infections was an unmatched analysis; given the age-sex differences between ID patients and controls in those presenting, we cannot be sure how comparable the scenarios are for the two groups.

### *Context*

There are few recent studies about emergency hospital usage by adults with ID<sup>19</sup>. In England, the only previous large-scale national study (2005-09) relied solely on the identification of ID from hospital data<sup>8</sup>. We estimate that approximate 1-in-3 adults with ID who have an emergency admission in England will not have their ID recorded and this may explain the small differences in crude ACSC admission rates (ID: 76 per 1,000 per year vs 61 in this study), as less severe cases of ID are less likely to be recorded in hospital data<sup>8</sup>. Despite being unable to calculate population based admission rates, their estimated relative increase in admissions for ACSCs was similar at around five times higher for adults with ID compared to those without<sup>8</sup>. There are three other large-scale studies on hospitalisations of adults with ID, but they were unable to differentiate between emergency and planned admissions<sup>9,20,21</sup>. Our focus on preventable emergency admissions means that any comparison is difficult, as we would not expect good primary care management to decrease planned admissions for ACSCs.

### *Implications*

Accurate and detailed information on the hospitalisation patterns of people with ID is essential for future planning and policy making<sup>22</sup>. In particular, with increasing life

expectancy for adults with ID<sup>23</sup> it is essential that preventable admissions are described so that appropriate interventions can be developed. Our work is the first in the UK to use an unselected group of adults with ID to accurately quantify differences in emergency admissions. The higher emergency admission rate, which is even more marked for preventable admissions, highlights an area where improvements could be made. We have also highlighted important ACSCs for this group (aspiration, constipation, GERD) which are often absent from general population definitions.

Over half of those adults with ID admitted for a UTI or a LRTI present to primary care in the prior two weeks, providing opportunities for management to avoid admissions. However, their primary care utilisation and management was not noticeably different from patients without ID, despite their primary care records more likely to identify them as being at high of complications from these conditions. Integrated risk stratification software is increasingly available in primary care<sup>24</sup> and could be extended to better incorporate ID patients, thereby facilitating the most appropriate initial management<sup>25</sup> and follow-up monitoring.

Our previous work has identified the potential for improvements in primary care for adults with ID, making sure they see their usual doctor where possible, and are offered longer consultations where necessary<sup>12</sup>. The introduction of annual health checks by NHS England for this group may be providing other improvements in their quality of care<sup>26</sup>. Despite approximately only half of those eligible currently receiving one<sup>27</sup>, we showed an association between health checks and reduced admissions for ACSCs<sup>28</sup>. Therefore, identifying further improvements in surveillance, together with appropriate treatment reflecting their increased risk and unique healthcare needs, may improve their overall

primary care management and potentially lead to a reduction in unplanned hospital admissions.

**Conflicts of Interest**

None

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**Table 1: All emergency admissions during 2009-13, number of people, rates (per 1,000 people per year) and incidence rate ratios for ID versus controls from unadjusted and adjusted analysis, split by characteristics of the ID group.**

	Adults with ID			Age-sex-practice matched controls	Unadjusted Model*		Adjusted Model†	
	People	Admissions	Rate	Rate	IRR (95% CI)	P value‡	IRR (95% CI)	P value‡
All Adults	16,666	9,026	182.2	67.7	2.82 (2.66 – 2.98)	-	2.16 (2.02 – 2.30)	-
<b>Stratified by matched factor</b>								
Sex								
- Female	6,989	4,250	203.8	73.5	2.90 (2.66 – 3.15)	-	2.09 (1.89 – 2.30)	-
- Male	9,677	4,776	166.5	63.4	2.75 (2.55 – 2.96)	0.36	2.20 (2.01 – 2.41)	0.45
Age (at baseline)								
- 18 to 34 years	6,981	2,374	125.3	50.5	2.54 (2.31 – 2.80)	-	1.81 (1.61 – 2.04)	-
- 35 to 54 years	6,283	3,201	159.3	55.6	2.96 (2.69 – 3.25)	0.03	2.10 (1.87 – 2.37)	0.09
- 55 to 84 years	3,402	3,451	328.7	116.7	2.90 (2.63 – 3.19)	0.06	2.43 (2.19 – 2.70)	<0.001
<b>Stratified by characteristic of adult with ID</b>								
Down Syndrome								
- Yes	1,793	804	150.0	62.9	2.61 (2.23 – 3.05)	-	2.37 (1.97 – 2.84)	-
- No	14,873	8,222	186.1	68.2	2.84 (2.68 – 3.01)	0.31	2.11 (1.96 – 2.26)	0.27
Communal Accommodation								
- Yes	3,392	2,141	205.7	75.0	2.91 (2.63 – 3.22)	-	2.15 (1.88 – 2.47)	-
- No	13,274	6,885	175.9	65.7	2.79 (2.61 – 2.98)	0.50	2.16 (2.00 – 2.33)	0.95
High level of support needs‡								
- Yes	3,263	2,487	243.9	70.2	3.67 (3.32 – 4.05)	-	3.83 (3.42 – 4.28)	-
- No	13,403	6,539	166.2	67.1	2.59 (2.42 – 2.77)	<0.001	2.32 (2.16 – 2.49)	<0.001

\* IRR from conditional Poisson model for ID vs control. Matched on age, sex and practice only.

\*\*Additionally adjusted for nine QOF diseases, IMD quintile and smoking, apart from for High Support Needs where Epilepsy is not used in the adjustment.

† Has been classed as having Severe or Profound ID by GP or has 2 or more of the following: epilepsy, cerebral palsy or significant mobility problem (wheelchair use or greater problem), severe visual impairment, severe hearing impairment, a continence problem or use of PEG feeding.

‡ p-values test for difference in IRR between subgroups (for age, 18-34 years is taken as baseline group)

IRR: Incidence Rate Ratio, ID: Intellectual Disability

**Table 2: Number of admissions, rate per 1,000 individuals per year and incident rate ratios for conditions resulting in preventable admissions (ACSCs).**

Condition	Adults with ID		Age-sex-practice matched controls		IRR (95% CI)
	N	Rate	N	Rate	
Angina	47	1.0	329	1.0	1.00 (0.60 – 1.68)
Aspiration	152	3.1	25	0.07	85.9 (45.3 – 162.9)
Asthma	91	1.8	233	0.7	2.84 (1.99 – 4.06)
Cellulitis	156	3.1	331	1.0	3.31 (2.56 – 4.28)
Chronic obstructive pulmonary disease (COPD)	105	2.1	454	1.3	1.68 (1.04 – 2.70)
Congestive heart failure	44	0.9	156	0.5	2.21 (1.44 -3.38)
Constipation	128	2.6	142	0.4	6.79 (5.17 – 8.91)
Convulsions/epilepsy	1,081	21.8	256	0.8	31.2 (24.6 – 39.5)
Dehydration & gastroenteritis	141	2.9	224	0.7	4.71 (3.60 – 6.17)
Dental conditions	22	0.4	52	0.2	2.80 (1.67 – 4.71)
Diabetes complications	61	1.2	140	0.4	3.26 (1.90 – 5.58)
Ear, nose and throat	28	0.6	132	0.4	1.42 (0.93 – 2.17)
Gangrene	1	0.02	10	0.03	-
Gastroesophageal reflux disease (GERD)	22	0.4	74	0.2	2.22 (1.35 – 3.67)
Hypertension	3	0.06	32	0.1	-
Influenza	8	0.2	18	0.05	-
Iron deficiency anaemia	21	0.4	40	0.1	3.97 (2.18 – 7.20)
Nutritional deficiencies	0	0	2	0.01	-
Pelvic inflammatory disease	5	0.1	26	0.08	-
Perforated/bleeding ulcer	10	0.2	20	0.06	3.78 (1.63 – 8.75)
Pneumonia and other lower respiratory tract infections (LRTI)	566	11.4	772	2.3	5.59 (4.85 – 6.45)
Tuberculosis and other vaccine preventable	1	0.02	11	0.03	-
Urinary tract infections (UTI)	345	7.0	528	1.5	4.76 (3.99 – 5.68)
<b>All ACSCs</b>	<b>3,038</b>	<b>61.3</b>	<b>4,007</b>	<b>11.7</b>	<b>5.62 (5.14 – 6.13)</b>

Note: Estimates for Gangrene, Hypertension, Influenza, Nutritional deficiencies, Pelvic inflammatory disease and Tuberculosis were not estimated due to insufficient number of admissions.  
IRR: Incidence Rate Ratio, ID: Intellectual Disability

**Table 3: Emergency admissions for ACSCs during 2009-13, number of people, rates (per 1,000 people per year) and incidence rate ratios for ID versus controls from unadjusted and adjusted analysis, split by characteristics of the ID group.**

	Adults with ID			Age-sex-practice matched controls	Unadjusted Model*		Adjusted Model†	
	People	Admissions	Rate	Rate	IRR (95% CI)	P value‡	IRR (95% CI)	P value‡
All Adults	16,666	3,038	61.3	11.7	5.62 (5.14 – 6.13)	-	3.60 (3.25 – 3.99)	-
<b>Stratified by matched factor</b>								
Sex								
- Female	6,989	1,428	68.5	13.1	5.68 (5.03 – 6.42)	-	3.35 (2.87 – 3.91)	-
- Male	9,677	1,610	56.1	10.7	5.56 (4.91 – 6.30)	0.81	3.89 (3.39 – 4.46)	0.16
Age (at baseline)								
- 18 to 34 years	6,981	805	42.5	6.2	7.12 (5.96 – 8.51)	-	3.06 (2.47 – 3.79)	-
- 35 to 54 years	6,283	1,041	51.8	8.6	6.34 (5.43 – 7.39)	0.34	3.25 (2.74 – 3.87)	0.67
- 55 to 84 years	3,402	1,192	113.5	26.2	4.56 (4.00 – 5.20)	<0.001	4.09 (3.52 – 4.76)	0.03
<b>Stratified by characteristic of adult with ID</b>								
Down Syndrome								
- Yes	1,793	392	73.1	9.3	10.00 (7.54 – 13.28)	-	8.28 (5.73 – 11.98)	-
- No	14,873	2,646	59.9	12.0	5.26 (4.79 – 5.77)	0.001	3.21 (2.88 – 3.58)	0.002
Communal Accommodation								
- Yes	3,392	915	87.9	14.0	6.86 (5.78 – 8.14)	-	4.98 (4.01 – 6.20)	-
- No	13,274	2,123	54.2	11.1	5.20 (4.70 – 5.76)	0.01	3.35 (2.98 – 3.77)	0.006
High level of support needs†								
- Yes	3,263	1,154	113.2	12.1	10.31 (8.81 – 12.07)	-	11.78 (9.78 – 14.19)	-
- No	13,403	1,884	47.9	11.6	4.40 (3.95 – 4.90)	<0.001	4.28 (3.80 – 4.81)	<0.001

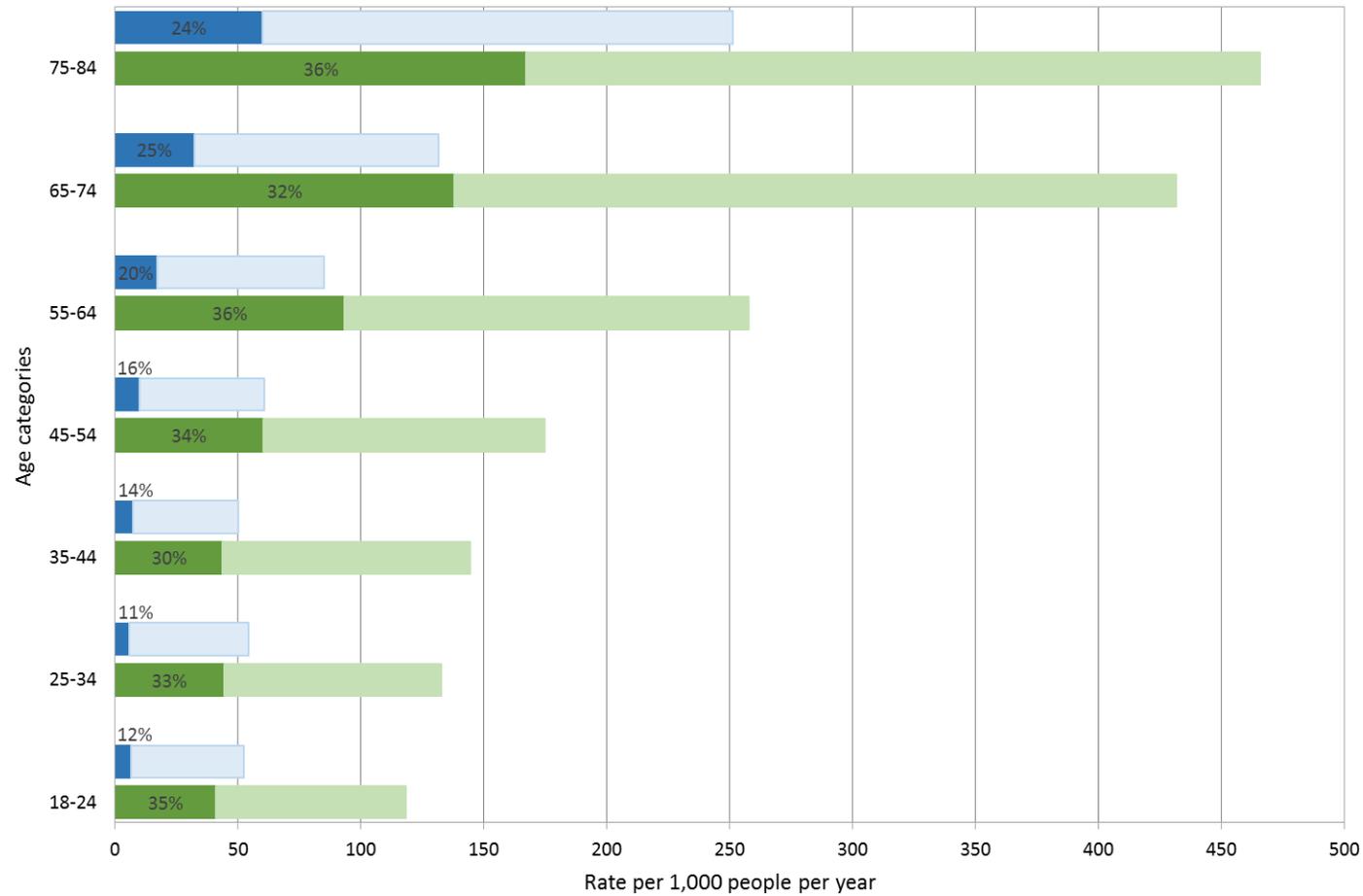
\* IRR from conditional Poisson model for ID vs control. Matched on age, sex and practice only.

\*\*Additionally adjusted for nine QOF diseases, IMD quintile and smoking, apart from for High Support Needs where Epilepsy is not used in the adjustment.

† Has been classed as having Severe or Profound ID by GP or has 2 or more of the following: epilepsy, cerebral palsy or significant mobility problem (wheelchair use or greater problem), severe visual impairment, severe hearing impairment, a continence problem or use of PEG feeding.

‡ p-values test for difference in IRR between subgroups (for age, 18-34 years is taken as baseline group)

IRR: Incidence Rate Ratio, ID: Intellectual Disability



**Figure 1: Differences in overall rates for emergency admissions and admissions for ACSCs by age group.** Dark green (dark blue) is the admission rates for ACSCs for adults with ID (controls). Non-ACS emergency admission are plotted in light green (light blue) for adults with ID (controls).

**Table 4: Healthcare usage in the two weeks prior to hospitalisation among patients having a first emergency admission for UTI and LRTI or pneumonia.**

	UTI		LRTI or Pneumonia	
	Adults with ID (n=276)	Adults without ID (n=451)	Adults with ID (n=457)	Adults without ID (n=671)
<b>Age</b>				
- Mean (years)	54.8	51.6	52.2	56.5
- 18 to 34 years, No. (%)	43 (16%)	123 (27%)	84 (18%)	81 (12%)
- 35 to 54 years, No. (%)	77 (28%)	115 (26%)	145 (32%)	194 (29%)
- 55 to 84 years, No. (%)	156 (57%)	213 (47%)	228 (50%)	396 (59%)
<b>Sex</b>				
- Male, No. (%)	134 (49%)	150 (33%)	260 (57%)	384 (57%)
<b>At high risk of complications from infection<sup>o</sup></b>				
- Yes, No. (%)	139 (50%)	117 (26%)	108 (24%)	23 (3%)
<b>Healthcare use</b>				
- Consulted at family practice, No. (%)	156 (56%)	251 (56%)	277 (61%)	368 (55%)
- No consultation, but emergency encounter*, No. (%)	19 (7%)	32 (7%)	27 (6%)	39 (6%)
- Other record of encounter only**, No. (%)	70 (25%)	85 (19%)	97 (21%)	131 (20%)
- No record of usage, No. (%)	31 (11%)	83 (18%)	56 (12%)	133 (20%)
<b>Among those who consulted at family practice only</b>				
- Diagnosis recorded, No. (%)	22 (14%)	45 (18%)	60 (22%)	80 (22%)
- Urine tested <sup>g</sup> , No. (%)	44 (28%)	75 (30%)	NA	NA
- Antibiotics prescribed, No. (%)	62 (40%)	115 (46%)	111 (40%)	163 (44%)
- None of the above, No. (%)	76 (49%)	118 (47%)	151 (55%)	187 (51%)
<b>Among those prescribed antibiotics only</b>				
Type of antibiotic				
- Frontline <sup>s</sup> only, No. (%)	29 (47%)	57 (50%)	65 (59%)	113 (69%)
- Other only, No. (%)	28 (45%)	52 (45%)	32 (29%)	34 (21%)
- Frontline <sup>s</sup> and other, No. (%)	5 (8%)	6 (5%)	14 (13%)	16 (10%)
Number prescribed				
- One antibiotic prescribed, No. (%)	55 (89%)	94 (82%)	88 (79%)	130 (80%)
- More than one prescribed, No. (%)	7 (11%)	21 (19%)	23 (21%)	33 (20%)

**Footnote for Table 4**

\*Includes ER and other out-of-hours services.

\*\*Other records are repeat prescriptions, administrative entries or routine specialist appointments.

§ Frontline antibiotics are Nitrofurantoin and Trimethoprim for UTI and Amoxicillin, Clarithromycin, Doxycycline and Erythromycin for pneumonia/LRTI.

%High risk UTI patients have a history of specific kidney operations, UTIs, catheter or incontinence and for pneumonia/LRTI those with a history or recurrent chest infections, pneumonitis, PEG feeding, prescriptions for food thickeners or having 2 or more chest infections in the preceding year.

&Urine tests include both immediate dipstick and non-immediate urine microscopy. 37 (84%) of adults with ID and 62 (83%) of adults without ID have urine microscopy.

ID: Intellectual Disability, UTI: Urinary Tract Infection, LRTI: Lower Respiratory Tract Infection