Kent Integrated Dataset (KID)
Use of linked data for applied analytics to support service planning
Moving towards a JSNA ‘plus’ – framing the right questions

Modelling and simulation for capacity planning

- Complex care evaluation - matched controlled analyses
- Predictive modelling / risk stratification
- Population segmentation / capitation budgets
KID - The story so far

- Started 4 years ago as national pilot
- KCC Public Health works closely with local data warehouse team that collates and link NHS and non NHS data from up to 250 health and social care organisations
- ~700 million rows of data vs 897 columns, spread across 28 exclusive data tables
- Minimal cost but IG arrangements time consuming
- > 30 analytical projects carried out supporting local health and care commissioning including Kent & Medway STP
- Development is incremental – Adding more datasets, flags, segmentation tools etc
- Considerable R&D potential – number of universities want to work with us
- New supplier for CCG business intelligence – OPTUM will start developing new KID next year
What datasets make up the KID?

GP >220/238 practices signed up as of Aug 2017

Mental health
Out of hours
Acute hospital
Public health
Adult social care
Ambulance service
Hospice

HISBI data warehouse (Trusted Third Party Data Processor)

KID minimum dataset: data on activity, cost, service/treatment received, staffing, commissioning and providing organisation, patient diagnosis, demographics and location.

Datasets linked on a common patient identifier (NHS number) and pseudonymised derived from Patient Master Index (Household level data is linked via pseudonymised UPRN)

KENT INTEGRATED DATASET
Accessed securely by Kent County Council Public Health

Arrangements are in progress to link to data covering other services, including:

Health and social care services: Children’s social care, child and adolescent mental health, improving access to psychological therapies, and non-SUS-reported acute care.

Non-health and social care services: District council, HM Prisons, Fire and Rescue, Probation, and Education.
### What information does the KID hold?

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Segmentati on tools</th>
<th>Provider/commissioner</th>
<th>Diagnoses</th>
<th>Activity/cost</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>IMD</td>
<td>Practice code</td>
<td>Morbidity profile (Read codes)</td>
<td>Contact date</td>
<td>Healthcare Resource Groups (acute)</td>
</tr>
<tr>
<td>Sex</td>
<td>CPM (Risk Stratification tools)</td>
<td>Provider code</td>
<td>Referral source</td>
<td>Cost/price</td>
<td>Tariff cluster (mental health)</td>
</tr>
<tr>
<td>Lower Super Output Area</td>
<td>MOSAIC</td>
<td>Commissioner code</td>
<td>Point of delivery</td>
<td></td>
<td>Care Package (social care)</td>
</tr>
<tr>
<td></td>
<td>ACORN</td>
<td></td>
<td></td>
<td></td>
<td>Service code (community)</td>
</tr>
<tr>
<td></td>
<td>eFrI (Frailty score)</td>
<td></td>
<td></td>
<td></td>
<td>Specialty (outpatient)</td>
</tr>
<tr>
<td></td>
<td>ACG (Restricted use)</td>
<td></td>
<td></td>
<td></td>
<td>Staff type</td>
</tr>
</tbody>
</table>
Examples of analyses
# Population segmentation

Initial focus has been on developing a Local Care model for older people with complex needs

<table>
<thead>
<tr>
<th>Age</th>
<th>Mostly healthy</th>
<th>Chronic conditions (1-3)</th>
<th>Cancer</th>
<th>Neurological disorders</th>
<th>Dementia</th>
<th>Serious and enduring mental illness</th>
<th>Chronic conditions (4+)</th>
<th>Learning disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15</td>
<td>426</td>
<td>942</td>
<td>9,849</td>
<td>3,805</td>
<td></td>
<td>2,767</td>
<td>3,378</td>
<td></td>
</tr>
<tr>
<td></td>
<td>257.2</td>
<td>109.4</td>
<td>28.5</td>
<td>6.8</td>
<td>0.2</td>
<td>1.6</td>
<td>1.5</td>
<td>5.8</td>
</tr>
<tr>
<td>16-69</td>
<td>349</td>
<td>985</td>
<td>2,862</td>
<td>3,796</td>
<td>11,772</td>
<td>15,565</td>
<td>2,744</td>
<td>26,855</td>
</tr>
<tr>
<td></td>
<td>501.9</td>
<td>175.2</td>
<td>404.1</td>
<td>398.0</td>
<td>14.1</td>
<td>33.4</td>
<td>48.0</td>
<td>82.8</td>
</tr>
<tr>
<td>70+</td>
<td>1,981</td>
<td>1,782</td>
<td>2,420</td>
<td>4,262</td>
<td>7,681</td>
<td>24,943</td>
<td>4,576</td>
<td>42,310</td>
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<tr>
<td></td>
<td>218</td>
<td>41.4</td>
<td>79.1</td>
<td>141.0</td>
<td>8.5</td>
<td>20.6</td>
<td>4.1</td>
<td>17.6</td>
</tr>
</tbody>
</table>

Notes: KID data covers 50% of population and 32% of spend for scope area. Populations have been scaled to account for population registered to practices not flowing data into the KID. Spend has been scaled to match CCG data returns to account for data not included in the KID (e.g. non-Pill acute activity). Children’s social care, CAMHS, prescribing costs and continuing care costs are not included. People registered to GP surgeries which flow into KID but had no activity in 2015/16 have been added to ‘mostly healthy’ segments. KID data quality issues cause some people with long term conditions (including physical disability and SEMI) to be categorised erroneously as ‘mostly healthy’, artificially raising those segments’ spend and populations.

Source: Kent Integrated Dataset; Cannall Farrar analysis; latest version as of 31/03/2017
### Profiling Section 136 cohort

<table>
<thead>
<tr>
<th>Section</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>A - Country Living</td>
<td>2%</td>
</tr>
<tr>
<td>B - Prestige Positions</td>
<td>2%</td>
</tr>
<tr>
<td>C - City Prosperity</td>
<td>0%</td>
</tr>
<tr>
<td>D - Domestic Success</td>
<td>4%</td>
</tr>
<tr>
<td>E - Suburban Stability</td>
<td>6%</td>
</tr>
<tr>
<td>F - Senior Security</td>
<td>2%</td>
</tr>
<tr>
<td>G - Rural Reality</td>
<td>5%</td>
</tr>
<tr>
<td>H - Aspiring Homemakers</td>
<td>9%</td>
</tr>
<tr>
<td>I - Urban Cohesion</td>
<td>1%</td>
</tr>
<tr>
<td>J - Rental Hubs</td>
<td>9%</td>
</tr>
<tr>
<td>K - Modest Traditions</td>
<td>5%</td>
</tr>
<tr>
<td>L - Transient Renters</td>
<td>16%</td>
</tr>
<tr>
<td>M - Family Basics</td>
<td>19%</td>
</tr>
<tr>
<td>N - Vintage Value</td>
<td>5%</td>
</tr>
<tr>
<td>O - Municipal Challenge</td>
<td>7%</td>
</tr>
</tbody>
</table>

### Section 136 individuals indexed against Kent population

<table>
<thead>
<tr>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
</tr>
<tr>
<td>0.2</td>
</tr>
<tr>
<td>0.6</td>
</tr>
<tr>
<td>0.4</td>
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<tr>
<td>0.8</td>
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<td>2.8</td>
</tr>
<tr>
<td>2.0</td>
</tr>
<tr>
<td>1.1</td>
</tr>
<tr>
<td>5.3</td>
</tr>
</tbody>
</table>

### Acute activity

- In 2015/16 an average of:
  - 3.2 A&E attendances (0.2)
  - 1.1 emergency admissions (0.1)
  - 0.0 planned admissions (0.1)
  - 0.7 outpatient appointments (0.9)

### GP activity

- In 2015/16 an average of:
  - 11.7 consultations (5.4)

### Social care & secondary mental health costs

- **£11,610**
  - Secondary mental health (KPMT)
  - **£370**
    - Social care (£180)
Equity audit of Health Checks

Odds ratio of completing a Health Check by ACORN HH Type
(April 2015 to November 2016): Persons

Produced by KPHO (GAA, April 2017)
Exploiting new community collections

New national dataset coming on line in 2018; unlikely to allow detailed analysis prior to publication of 2019-20 allocations.

Now securing access to local datasets that might allow simple allocation formula and to prepare for full dataset coming on line.

Kent data presents a fantastic opportunity to check our assumption that the need for G&A is a good proxy for the need for community services, and to test interactions between community, G&A, primary and social care.

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**Early indicative results**

Age-cost curve for community services in this area is different to national G&A age-cost curve.
Utilizing linked data to evaluate Safe & Well Visits delivered by Kent Fire & Rescue Service

Richard Stanford Beale  Gerrard Abi Aad  Abraham George

INTRODUCTION

‘Fire as an Health Asset’ is a national initiative supported by Public Health England and NHS England, where Fire Authorities are expanding the remit of existing Home Safety Visits (HSVs) to broadly improve health and wellbeing of local residents, renamed Safe and Well visits.

Whilst, the primary objective of each visit is to enhance fire safety, opportunity is also taken to address other issues which might improve safety or wellbeing. This includes reducing the risk of falling, excess winter deaths, supporting smoking cessation, mental health, dementia, burns and scalds and general wellbeing.

AIM

To evaluate the positive impact of Safe & Well Visits undertaken by Kent Fire & Rescue Service on the safety and wellbeing of people using a linked dataset.

METHOD

HSV administrative data from Kent Fire & Rescue Service was linked with A&E Attendance data from the Kent Integrated Dataset (KID), to carry out a case control evaluation, matched for age, sex and deprivation, and assess any differences in intensity in A&E use between householders who had a HSV (7,458 persons) versus those who didn’t (9,588 persons), over the same time period.

Statistical assessment of the proportional differences showed that there was no significant variance between either group.

RESULTS

HSV data from KFRS was linked with A&E Attendance data from the KID, to carry out a case control evaluation, matched for age, sex and deprivation, and assess any differences in intensity in A&E use between householders who had a HSV (7,458 persons) versus those who didn’t (9,588 persons), over the same time period.

Of the 28,856 KFRS subjects identified, 7,478 (28%) were found to have attended A&E during the period 01 April 2012 to 30 September 2015.

Of these, 4,859 (65%) attended once only whereas 2,619 (35%) attended on two or more occasions. The subject to attendance ratio for this group was 1.63 attendances per person on average.

The 7,478 subjects included in the analysis were case matched to 9,588 (128.2%) ‘control’ subjects in the A&E attendance dataset. The subject to attendance ratio for this group was 1:1.

The 28,856 KFRS subjects identified, 7,478 (28%) were found to have attended A&E during the period 01 April 2012 to 30 September 2015.

Non parametric tests were used to assess whether or not the proportional distribution in A&E attendances differed between the control and the intervention groups.

A two-way analysis of variance by ranks revealed no significant differences between both groups (p=0.180).

REFERENCES

1. Working Together Working Together
2. Principles for a Safe and Well visit
3. Evaluation Report

www.kent.fire.uk.org
www.kent.gov.uk
www.kpho.org.uk
### Type 2 (poorly pensioners) in Kent

**34,724** individuals

**1,695** individuals

**15,572** households*

**711** households

*Households have been identified as UPRN (Unique Property Reference Numbers), with all individuals recorded within the KIC PMI data set at a single property treated as a household.

### Type 2 (poorly pensioners): Demographics

**Age**
- 27% 65+ (19%)
- 48% under 65

**Gender**
- 52% female
- 48% male

**Deprivation**
- 18% in the most deprived decile

**Household composition (% of households)**
- 54% working age (18-64)
- 37% living alone
- 10% children only
- 5% dependants (1 adult, 1 more below)
- 5% dependants (1 child, 1 more above)

Source: Kent Integrated Dataset (KID), December 2017.

### GP activity

**5.3 consultations (3.7)**

In 2016/17 an average of:
- 0.4 A&E attendances (0.3)
- 0.2 emergency admissions (0.1)
- 0.2 planned admissions (0.1)
- 1.5 outpatient appointments (1.1)

*As recorded by GPs

### Type 2 (poorly pensioners): Risk Scores

**Risk scores**
- 8.1 average risk score (4.6)

**Electronic Family Index (EFI)**
- 0.073 average EFI [0.055]
Linking health and care providers in Kent through the UPRN

The UPRN has enabled public health to segment the population, to better understand its needs and target resources...

24.01.18

Learn more

Consultation on the National Street Gazetteer, GeoPlace DEC-Streets

GeoPlace wish to receive comments on the consultation on the National Street Gazetteer, GeoPlace DEC-Streets...

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06.12.17

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GeoPlace Data Entry Conventions and Best Practice for Streets

DEC-Streets Version 4.0 Consultation Version
Modelling and simulation for forward planning  

**Adult cohort model**

**Progression of need**

**Case finding, prevention (1/2/3), effective treatment etc**

Population cohorts aged 15 and over

- Healthy population
- At risk population
- Frail

- Single conditions
- Multiple conditions
- Deaths rates

Sources include: British Household survey (1990+), ONS pops/deaths, Health survey for England, published research

**Single conditions include:** Cardiovascular Disease, Diabetes, Respiratory, Mental Health, Digestive, Visual Impairment and musculoskeletal

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**Kent County Council**

[kent.gov.uk](http://kent.gov.uk)
The model interface and scenario generator

Changes in population health needs in response to prevention strategies → impact on service utilization rates

Whole system cohort modelling Kent

Health and care impacts

Percentage of population by summary cohort

Switch smoking cessation

Percent increase in smoking cessation

Switch hyper tension primary prevention

Percent additional hypertension primary prevention drug treatment

Switch drug therapy secondary prevention

Percent reduced hypertension unregulated secondary
Developing a ‘Community of Practice’

Core

- Friends

- Associates

Wider system

Website and other communication approaches to keep people connected and to make the work of the CoP accessible and user-friendly

The KID and other relevant datasets

Expertise and coaching in SD modelling

STP/ACS Clinical and Strategic leadership groups

Shared Health and Care Analytics board
Key challenges – broad issues

- Poor understanding in the ‘complex supply chain’ of data management steps → fragmented resourcing → fragile end to end solution
- Commissioner provider split in the provision of informatics
- Poor understanding at senior / exec level in the use of population health analytics
- Lack of understanding when comparing methodological approaches eg. actuarial (commissioner tariff) vs population health needs
- Commissioner interest largely in bottom line
- Limited skills / emphasis in question setting
- Lack of expertise in applied analytics, analytical workforce fragmented across system
- Dysfunctional collaboration between Academia and CCGs / LAs – lack of needs led research strategy to support systems planning
Key challenges – Information Governance

- Labyrinth of governance of data controllers
- Varying interpretations of the data protection
- Varying risk appetite of data controllers
- Legal justification of use of person identifiers (NHS number matching currently not routinely available for non NHS datasets (except adult and children social care)
- Developing robust equivalent code of practice for safe secure transfer, linking and access to data (outside NHS Digital)
- Lack of understanding of uses of data (more emphasis on direct care vs population health analytics
- Satisfying GDPR – pseudonymised data is personal data (need to be more precise and strict in the design, implementation and enforcement of our code of practice
Key challenges – Data quality

- Varying data dictionaries (or a lack of)
- Quality of coding – eg. GP data ‘wild west’
- Gaps – data on activity but no costs
- Cost vs price
- Other issues: data on drugs - prescribed vs dispensed
- Updating registered patient lists - addresses up to date
Moving forward…key messages

• Huge amount of routine administrative data generated in health and wider public sector – data warehousing more economical than previously
• Most of them potential to be linked at person level and household level – reduce ‘ecological fallacy’
• Analytic uses are exponential
• Time is ripe for national policy to change to help rather than hinder democratization of access and link health and health data
• The right question framed → right sort of analytical approach → right sort of data / datasets → system leadership to bring the data together