

Patients and families

Patients in mind

# Patients in your heart



## Innovating for Health

## The Intelligent EHR



## Kvalitetsindikatorer baset på data fra medisinske kvalitetsregistre

...will be the development of a web based information technology for interactive data entry from electronic records

...however, this technology will not be available in the near future

# The health task for everyone

## Overview of health issues in East London

Indicators	Newham	Tower Hamlets	Waltham Forest	England Average
Life expectancy (males) <sup>2</sup>	76.2	76.7	77.4	78.6
Life expectancy (females) <sup>2</sup>	81.1	81.4	81.9	82.6
Infant death <sup>2</sup>	5.3	4.0	5.4	4.6
Deaths from smoking <sup>4</sup>	249	300	221	211
Early deaths: heart disease and stroke <sup>4</sup>	115	106	86	67.3
Early deaths: cancer <sup>4</sup>	112	135	114	110.1
People diagnosed with diabetes <sup>5</sup>	6.9	5.8	5.9	5.5
New cases of TB <sup>4</sup>	124	61	50	15.3
Acute sexually transmitted infections <sup>7</sup>	1673	1743	1359	775

**Key:**

Significantly worse than the England average

Not statistically different from the England average

Significantly better than the England average

Source: Association of Public Health Observations, Health Profile, June 12

1 Newham is the 2<sup>nd</sup> most deprived borough in England, City and Hackney the 4<sup>th</sup> most deprived, Tower Hamlets the 11<sup>th</sup> most deprived, Waltham Forest the 15<sup>th</sup> most deprived out of 152 in England.

2 At birth 2008 – 2010

3 Rate per 1000 live births 2008 – 2010

4 Per 100,000 population aged 35+ directly age standardised rate 2008 – 2010

5 % of people on GP regulators with a recorded diagnosis of diabetes in 2010/11

6 Crude rate per 100,000 population 2008 – 2010

7 Crude rate per 100,000 population 2011. Chlamydia screening coverage may influence rate



# Policy drivers



Health service reform



Wealth leads to health



Health services not affordable

# The recipe for health



## Keeping people well

- Exercise
- Eat well
- Drink moderately
- Don't smoke

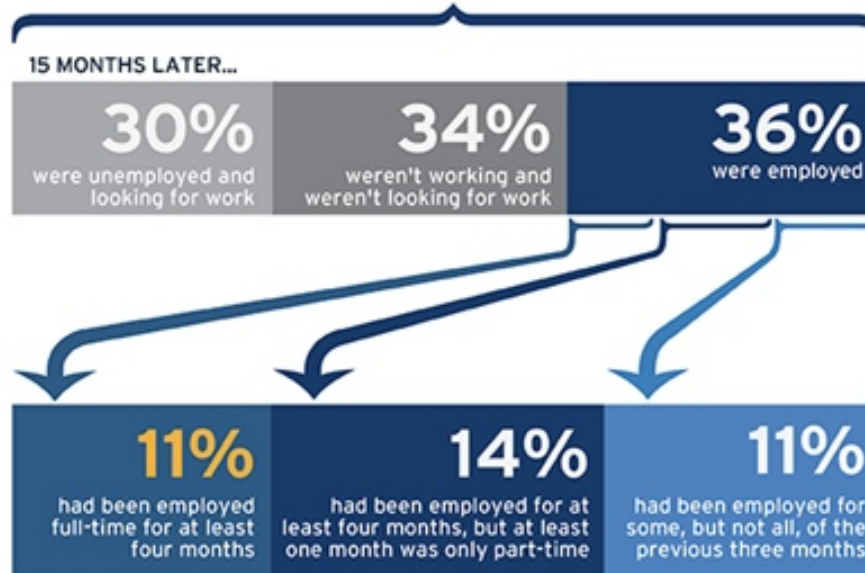
# ....and drive employment policies



## WHAT HAPPENS TO THE LONG-TERM UNEMPLOYED?

STATUS OF THOSE WHO SAID THEY HAD BEEN UNEMPLOYED FOR 27 WEEKS OR MORE IN A GIVEN MONTH IN 2008-12 AND WERE RE-INTERVIEWED 15 MONTHS LATER

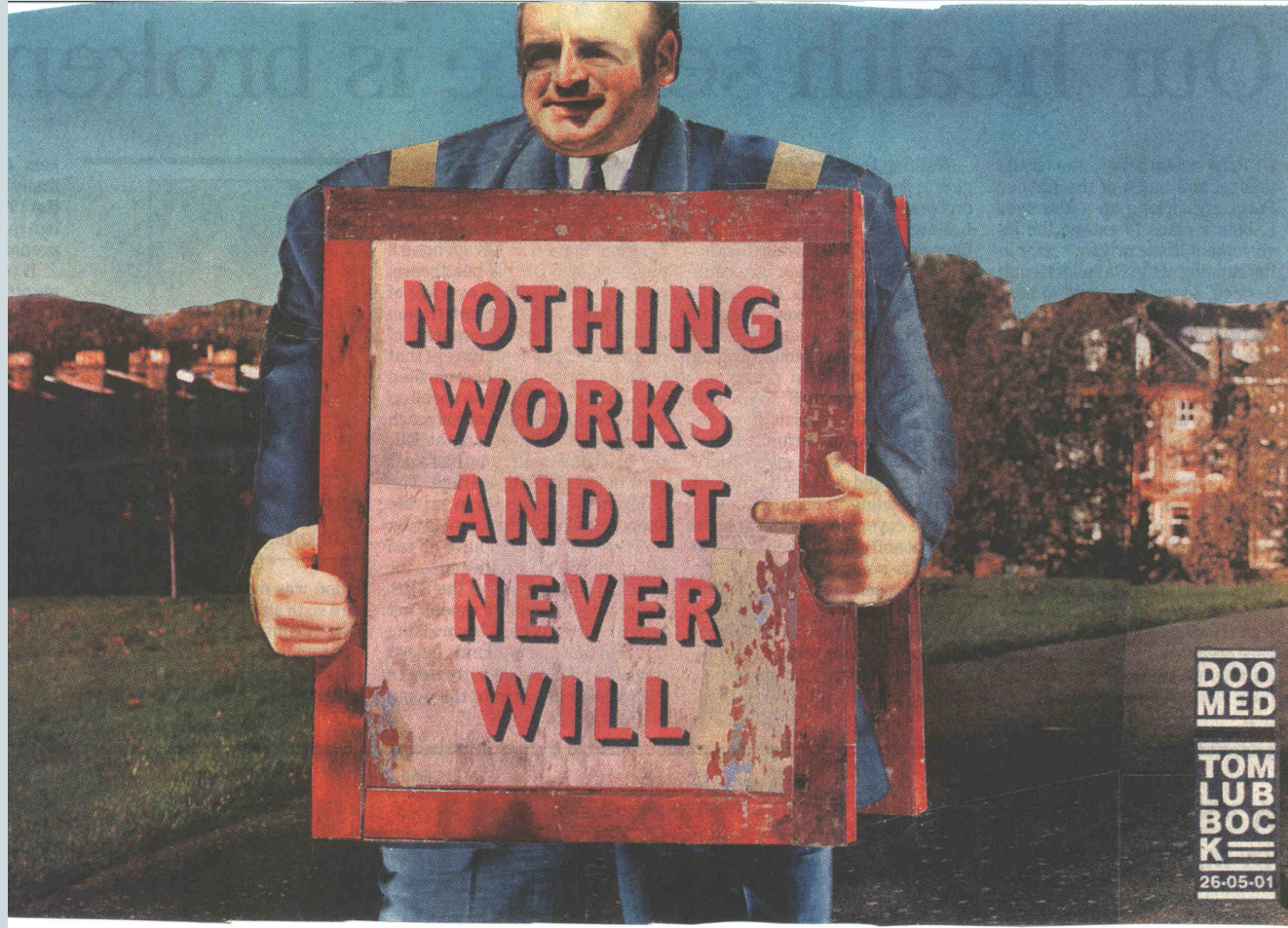
AMONG WORKERS WHO REPORTED THEY HAD BEEN UNEMPLOYED FOR 27 WEEKS OR MORE IN A GIVEN MONTH 2008-2012



Data from "Are the Long-Term Unemployed on the Margins of the Labor Market?" by Alan B. Krueger, Judd Cramer, and David Cho.

BROOKINGS

# Information revolution transforms culture



# Co-create health using technology and data



Personal health and fitness

Care record

Interoperability

Personally collected data

EHRs



# Framework for innovation



Know

- Identify and predict what will happen within your population

Engage

- Your patients and health staff to take action

Manage

- Outcomes to improve health and care

# 3 routes to changing culture



- Natural language processing and AI
- Use of social media for health
- Patient access to enterprise wide health IT systems

# Identifying and predicting



- Knowledge and skill
- Long term conditions
- Use your registry data
- Visualise the data
- The cutting edge of computation

# Turning dialogue into health



**Boston Children's Hospital**  
Until every child is well™

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Health Topics

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SEARCH



## Research + Innovation

[Home](#) > [Research + Innovation](#) > [Research Labs](#) > [Natural Language Processing Lab](#)

Centers, Labs, Vector Articles



- ▶ [Natural Language Processing Lab](#)
- ▶ [Lab Personnel](#)
- ▶ [Current Projects](#)
- ▶ [CHIP NLP Software](#)
- ▶ [Partners](#)
- ▶ [Publications](#)
- ▶ [Contact](#)

### Natural Language Processing Lab



Our mission is to develop and implement Natural Language Processing (NLP) technologies to apply to the electronic medical record. These technologies include core NLP tasks such as relation extraction, coreference resolution, and parsing, and make use of statistical machine learning methods. In order to use many machine learning methods, manually labeled (annotated) domain- and task-specific data is required. To that end, we are heavily involved in many different clinical document annotation projects. Since manual annotation is a time-consuming, painstaking, expensive process, it is also our goal to develop and use algorithms that minimize the required amount of labeled data required while maximizing the use of existing labeled data.

Use cases for clinical NLP include automated phenotyping, cohort identification, and clinical question answering.

Our end-to-end system is called cTAKES (clinical Text And Knowledge Extraction System). See left panel under Software for more information about cTAKES.

[Request an Appointment](#)

[Find a Doctor](#)

[Condition & Treatments](#)



[Visitor Information](#)

# Decision support and AI



## ATC BAYESIAN NETWORK

Prognostic Model for Acute Traumatic Coagulopathy




<a href="#">HOME</a>	<a href="#">ATC BN</a>	<a href="#">EVIDENCE BROWSER</a>	<a href="#">PUBLICATIONS</a>	<a href="#">CONTACT US</a>
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*ATC BN*

Background Information				Primary Survey			
Mechanism of Injury	Energy of Injury	Fluid Volume Transfused	Age	Haemothorax	Long Bone Injury	Unstable Pelvis	FAST Scan
<input type="radio"/> Penetrating <input type="radio"/> Blunt <input checked="" type="radio"/> Unknown	<input type="radio"/> High <input type="radio"/> Low <input checked="" type="radio"/> Unknown	<input type="radio"/> ≥ 500ml <input type="radio"/> < 500ml <input checked="" type="radio"/> Unknown	<input type="radio"/> ≥ 65 <input type="radio"/> < 65 <input checked="" type="radio"/> Unknown	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> Unknown	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> Unknown	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> Unknown	<input type="radio"/> Positive <input type="radio"/> Negative <input checked="" type="radio"/> Unknown

Vitals			Arterial Blood Gas		
Heart Rate	Systolic Blood Pressure	Glasgow Coma Score	Lactate	Base Excess	pH
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

[Calculate ATC Risk](#)

ATC BN is powered by 

© 2013 Risk and Information Management (RIM) Research Group, Queen Mary, University of London

# Data driven clinical management



## Sepsis Identification

**St. John Sepsis Agent – v14**  
2013-06-14

Existing Patient or Admitted Caregiver

Temp:  $\leq 36$  or  $> 38.3$  C

HR:  $\geq 95$

RR:  $\geq 21$

Glucose  $\geq 140$  mg/dL and  $\leq 200$  mg/dL

WBC  $\geq 12k$  or  $\leq 4k$  or Band  $\geq 10\%$

Diagnosis of Infection

2/5 SIRS Criteria Met?

Look back 30 hrs. for initial presentation (i.e. for lactate)

Lactate  $\geq 2.0$  mmol/L

SBP  $\leq 90$  mmHg OR MAP  $\leq 65$  mmHg

Creatinine increase of  $\geq 0.5$  mg/dL over 24hrs

Bilirubin  $\geq 2.0$  mg/dL or  $\geq 1.8$  mg/dL

Urine: Normal? Creatinine that date elevated (x3)? At least 3 signs of organ dysfunction or 2 SIRS?

2/5 SIRS Criteria Met?

SIRS Alert suggests likely culture in 24hrs or 48hrs or 72hrs

Final Sepsis Alert? send notifications

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**Monitoring**

- Over 130 facilities
- 32,960 persons per hour
- 791,040 lives per day

**Operating Characteristics**

- Sensitivity 68-91%
- Specificity 91-97.6%
- PPV up to 68%

506 lives saved over 2 yrs

33%  $\uparrow$  case identification

Sepsis mortality  $\downarrow$  15.8 to 13.3% all categories

Simple Sepsis to Septic Shock progression  $\downarrow$  12%

Sepsis LOS  $\downarrow$  0.9 days (severe 1.4 days)

32% decrease in observed sepsis deaths vs. expected

# Engage everyone



- Create virtual networks
- Get people together for purpose
- Simplify the data
- Ask patients
- Ask people
- Ask families
- Do not interfere with knowledge creation

# People expect.....



Dear Charles,

Thank you so much for this. I will consider surgery and will go and see the GP. Hopefully the surgery will have access to the X-ray itself as well as to the report through the hospital's online system.

Warm regards,



# Social media



**Michael Seres** @mjseres · Mar 27

@GutteridgeC absolutely, am very happy/keen to help

 [View conversation](#)

 Reply  Retweet  Favorite  More

# Medical anxiety



**Dustyn Saint** @DustynSaint · Mar 22

@OsmanBhatti @GutteridgeC agree wholeheartedly but worry about practicalities of implementation

[View conversation](#)

[Reply](#) [Retweet](#) [Favorite](#) [More](#)



**Dustyn Saint** @DustynSaint · Mar 22

@OsmanBhatti @GutteridgeC don't disagree, but would also shift large amount of work to primary care with no resources to follow it...

[View conversation](#)

[Reply](#) [Retweet](#) [Favorite](#) [More](#)



**Osman Bhatti** @OsmanBhatti · Mar 22

@DustynSaint @GutteridgeC Would prevent patients having duplicate tests, duplicate appointments + reduce admin workload in chasing results

[View conversation](#)

[Reply](#) [Retweet](#) [Favorite](#) [More](#)

# Social media for learning



## Registrering av diagnoser i psykisk helsevern for barn og unge

Kilde: [Helsedirektoratet, Norsk Pasientregister](#)

FRITT SYKEHUSVALG • NORGE  
Pasientrådgiver telefonen 800 41 004

Denne indikatoren viser andelen pasienter som i sin journal har fått registrert diagnoser på de seks aksene i diagnosesystemet.

[Les mer om denne kvalitetsindikatoren her](#)

### Tematisk oversikt

Om kvalitet og kvalitetsindikatorer  
Kvalitetsindikatorer  
Helsetjenester

#### Behandlingssteder

Helseforetak

Helseregioner

Vis topp

Vis alle

Vis mine valg

[Endre mine valg](#)



Siste periode



Historisk utvikling



Tabell

#### Hoveddiagnosen

Hele landet: 86,8

#### Behandlingssted

#### Akse 1 - Hoveddiagnosen

Andel ▼

Hospitalet Betanien, Bergen



100,0

Helse Stavanger, Stavanger universitetssykehus



100,0

# Self service i-clinical care

**NHS choices** Your health, your choices

Search: Enter a search term

Health A-Z | **Live Well** | Care and support | Health news | Services near you

Customise this page or leave feedback | Customise this page

### NHS HEALTH CHECK

Helping you prevent

- diabetes
- heart disease
- kidney disease
- stroke & dementia

### Are you due an NHS Health Check?

Millions have already had their free NHS Health Check. If you're aged 40-74 and well, you will be invited. Don't miss out

- Find out about the NHS Health Check

**Health A-Z** Edit

Conditions and treatments (+) (-)

- Hip replacement
- Breast cancer
- Self-harm
- Diabetes
- Norovirus

Browse all conditions | Health encyclopaedia

Check your symptoms | Symptom checkers

**Services near you**

Urgent | Hospitals | GPs | Dentists

Enter a location below to find urgent care services

Postcode or town

Find urgent care

Find everything from care and support services to pharmacies, opticians and gyms

More services

**Care and support** Edit

Find and compare care homes and care at home services

### Find out about social care

Get information and advice on social care and find services in your area

Find care services

Topics (+) (-)

- About social care
- Choosing care services

# Manage outcomes using EHR data

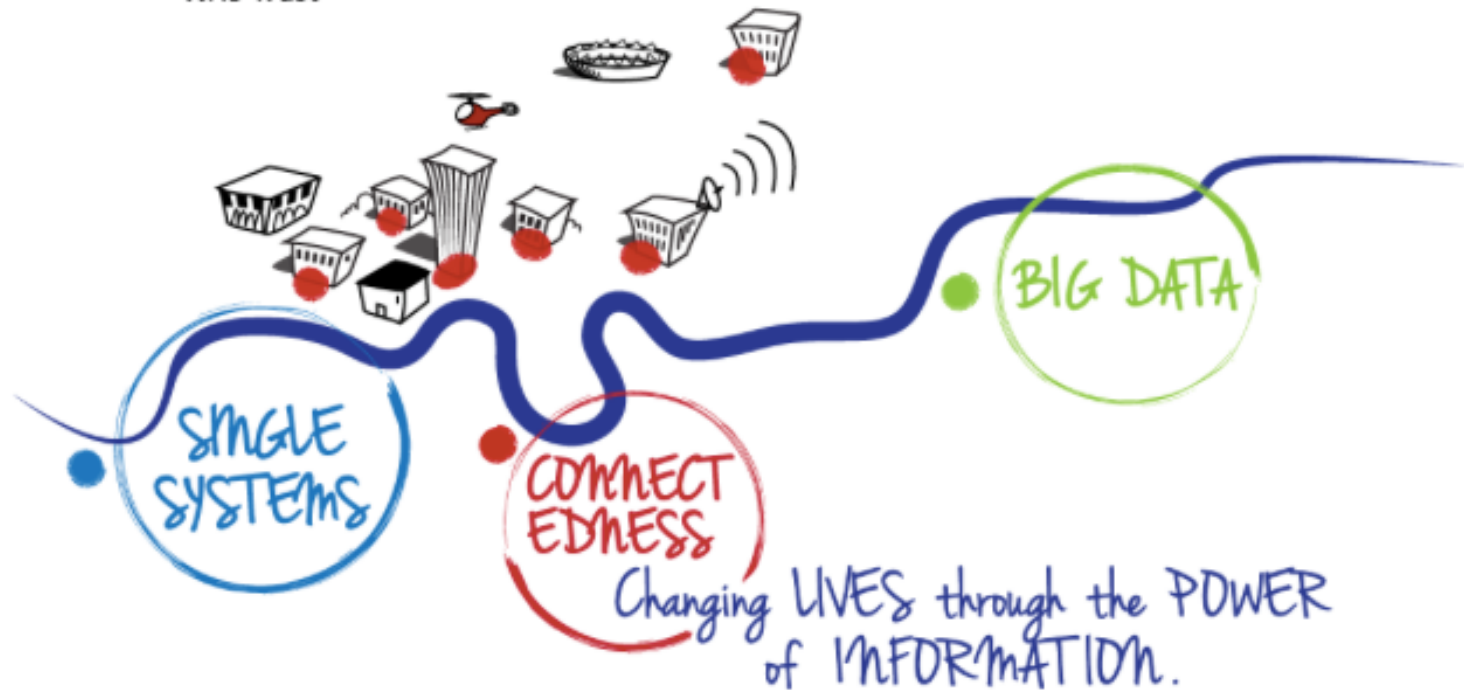


- **Single system**
- **Connectedness**
- **Big data**

# Bringing it all together for people and staff



Barts Health **NHS**  
NHS Trust



# Real time clinical performance management



Patient Info		VTE	Location	Ortho Consultant	Category	LOS	Adm Date	Ready for Surg Date	Ortho Dx	Co-Morb	Procedures	Requests	Treatment Plan	Appt
F	76 Y		RNJ RLH 10F (Side 4 04)	+	+	5 days 4 hrs	01-May-14 14:00	+			+		+	
M	45 Y		RNJ RLH 10F (Side 1 01)	+	+	1 day 15 hrs	05-May-14 03:00	+	+				+	
F	77 Y		RNJ RLH 10F (Side 6 06)	+	+	6 days 11 hrs	30-Apr-14 07:00	+					+	
F	56 Y		RNJ RLH 10F (Bay 2 13)	+	+	1 wk 1 day	28-Apr-14 07:00	+			+		+	
M	67 Y		RNJ RLH 10F (Bay 1 07)	+	+	5 days 11 hrs	01-May-14 07:00	+			+		+	
F	69 Y		RNJ RLH 10F (Bay 2 11)	+	+	1 wk 1 day	28-Apr-14 08:00	+			+		+	
F	43 Y		RNJ RLH 10F (Side 2 02)	+	+	6 days 7 hrs	30-Apr-14 11:00	+		+	+		+	

# Real time data collection



Ad Hoc Recording - [REDACTED]

<ul style="list-style-type: none"><li>Adult Inpatient<ul style="list-style-type: none"><li>Adult Admission Assess</li><li>Adult SafeGuarding</li><li>Vital Signs</li><li>Adult Risk Assessments</li><li>Adult Discharge Check</li><li>Doctor's</li></ul></li><li>AHP</li><li>Dementia</li><li>Psychiatry</li><li>Maternity</li><li>Emergency Department</li><li>Hepatology</li><li>T&amp;O</li><li>Surgery</li><li>All Items</li></ul>	<ul style="list-style-type: none"><li><input type="checkbox"/> Dementia Screening</li><li><input type="checkbox"/> NIH Stroke Score</li><li><input type="checkbox"/> Pressure Ulcer Skinn Bundle</li><li><input type="checkbox"/> Urinary Catheter Insertion</li><li><input type="checkbox"/> Urinary Catheter Maintenance</li><li><input type="checkbox"/> Urinary Catheter Maintenance (Change Bag)</li><li><input type="checkbox"/> Vital Signs Adult</li><li><input type="checkbox"/> Vital Signs Paeds</li><li><input type="checkbox"/> Waterlow Score</li><li><input type="checkbox"/> Respiratory Care and Rehabilitation</li></ul>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------





\*Performed on: 06/05/2014 1856 BST

- HCV Rx Form 1
- HCV Rx Form 2
- HCV Rx Form 3
- HCV Rx Form 4
- HCV Rx Form 5
- HCV Rx Form 6
- HCV Adult Vital 9

## Hepatitis C Treatment Assessment

Allergies and Demographics already captured in PowerChart: name, address, MRN, NHS no, D numbers

Country Of Birth:

### Treatment Work Up

### Hepatitis C Genotype:

- |                               |                               |                         |
|-------------------------------|-------------------------------|-------------------------|
| <input type="radio"/> 1a      | <input type="radio"/> 3a      | <input type="radio"/> 5 |
| <input type="radio"/> 1b      | <input type="radio"/> 3b      | <input type="radio"/> 6 |
| <input type="radio"/> 1 Other | <input type="radio"/> 3 Other |                         |
| <input type="radio"/> 2       | <input type="radio"/> 4       |                         |

### Source Of Referral:

- |                                              |                                    |
|----------------------------------------------|------------------------------------|
| <input type="radio"/> Royal London Hospital  | <input type="radio"/> Colchester   |
| <input type="radio"/> Newham Hospital        | <input type="radio"/> Southend     |
| <input type="radio"/> Whipps Hospital        | <input type="radio"/> HALT Project |
| <input type="radio"/> Queens BHRUT           | <input type="radio"/> Hackney DBS  |
| <input type="radio"/> Sexual Health (Newham) | <input type="radio"/> Other:       |
| <input type="radio"/> SAU Mile End           |                                    |
| <input type="radio"/> Basildon               |                                    |

### Hepatitis MDT Discussion

#### MDT Date:

#### MDT Comment:

Menu		
Inpatient Summary		
Outpatient Summary		
Patient Information		
Overview		
Chart Review		
Allergies	+ Add	
Problems and Diagnoses		
Procedures and Diagnoses		
Histories		
Requests	+ Add	
Activity List		
Results Review		
Form Browser		
Clinical Notes		
Documentation	+ Add	
Pregnancy	+ Add	
iView		
Pregnancy Summary		
Newborn Summary		
Appointments		
Barts Community View		

**Disclaimer: [Hide]**

ATTENTION: This record is an aggregate summary of medical information obtained from multiple participating healthcare providers to support optimal patient care. It is not intended to replace the patient's medical record nor is it guaranteed to encompass all historical information to you in conformation with patient privacy requirements governed by the Data Protection Act 1998. All usage of this system is subject to the terms and conditions of the Data Protection Act 1998.



Born: 24-Jan-1947

AGE: 67 Years

Gender: Male

No: **NHS** [Redacted]

Page Search:  Search Reset

**Provider Reports** [Print](#) [-/+](#)

Report Type	Source
<a href="#">MIG Document - Summary</a>	Chrip Street Health Centre

Search:

- Appointments- [No Results]
- Allergies- [No Results]
- Lab Orders (Past 6 Months Displayed On Default)- [No Results]
- Immunisation / Vaccine History- [No Results]
- Microbiology- [No Results]
- Anatomic Pathology- [No Results]

**Visits**

Location	Encounter Type	Speciality
RNJ ROYALLONDON , RNJ Fracture	OUTPATIENT	Trauma and Orthopaedics
RNJ ROYALLONDON , RNJ Fracture	OUTPATIENT	Trauma and Orthopaedics
RNJ ROYALLONDON , RNJ Therapy OP	OUTPATIENT	Trauma and Orthopaedics
RNJ BARTS , RNJ MOPD SBH	OUTPATIENT	Trauma and Orthopaedics

Search:

**Vital Signs / Clinical Results (Last 4 Results)**

**Current Problems**

28-Nov-2013	<b>Lumbar spinal stenosis</b>
11-Sep-2013	<b>Vitamin B12 deficiency</b>
11-Sep-2013	<b>Aortic regurgitation alone, cause unspecified</b>
24-Aug-2012	<b>Standard chest X-ray abnormal</b>
03-Jan-2012	<b>Knee joint pain</b>
17-Nov-2009	<b>Asteroid hyalosis</b>
28-Apr-2000	<b>Essential hypertension</b>
1999	<b>Pain in lumbar spine</b>

**Current Medication****Acute Medication**

**Carmellose 1% eye drops 0.4ml unit dose | Sterimar Nasal spray**

**Repeat Medication**

**Tramadol 50mg capsules | Allopurinol 300mg tablets | Amlodipine 10mg tablets | Atenolol 50mg tablets | Atorvastatin 20mg tablets | Beclometasone 50micrograms/dose nasal spray | Bendroflumethiazide 2.5mg tablets | Enalapril 20mg tablets | Omeprazole 20mg gastro-resistant capsules | Hydroxocobalamin 1mg/1ml solution for injection ampoules**

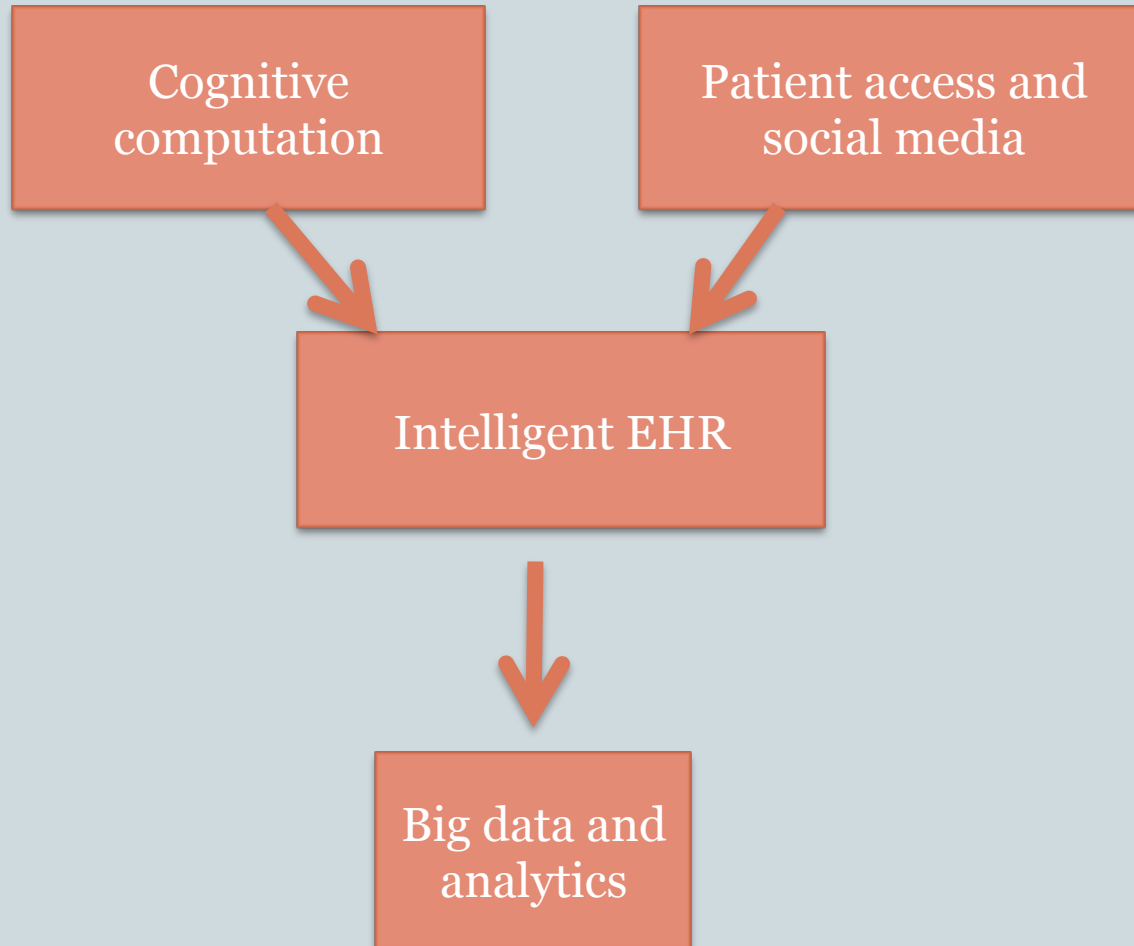
**Allergies and Adverse Reactions**

17-Jul-2007	<b>Adverse reaction to Simvastatin</b>
-------------	----------------------------------------

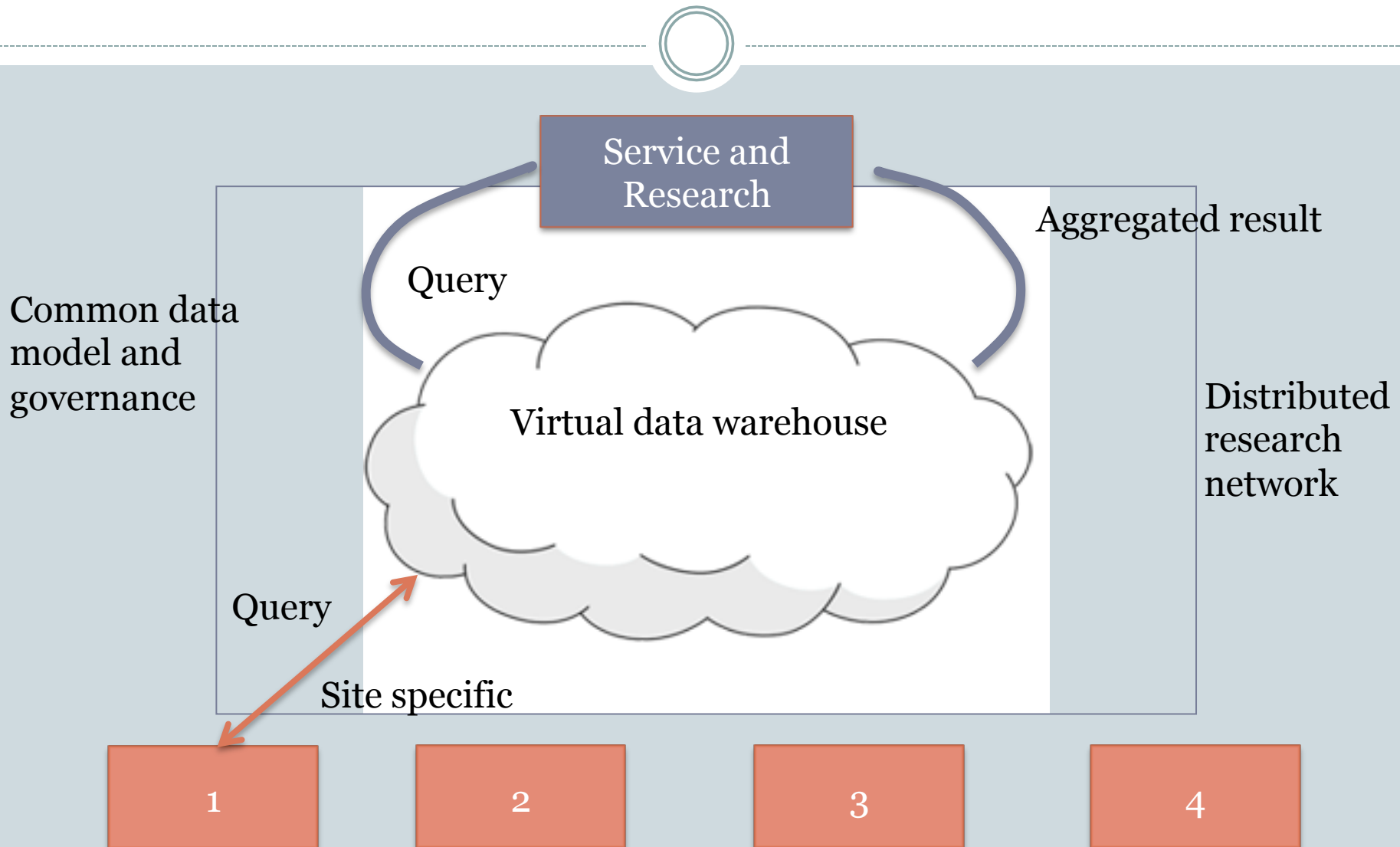
**Recent Tests**

24-Aug-2012	<b>Standard chest X-ray abnormal</b>	-	-
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# System map



# Towards population health delivery



# Challenges



- Semantic interoperability
- Common data model
- Privacy/confidentiality
- System development

# Issues



- Operating at scale
- Outcome measurements
- Analytics
- Connecting finance



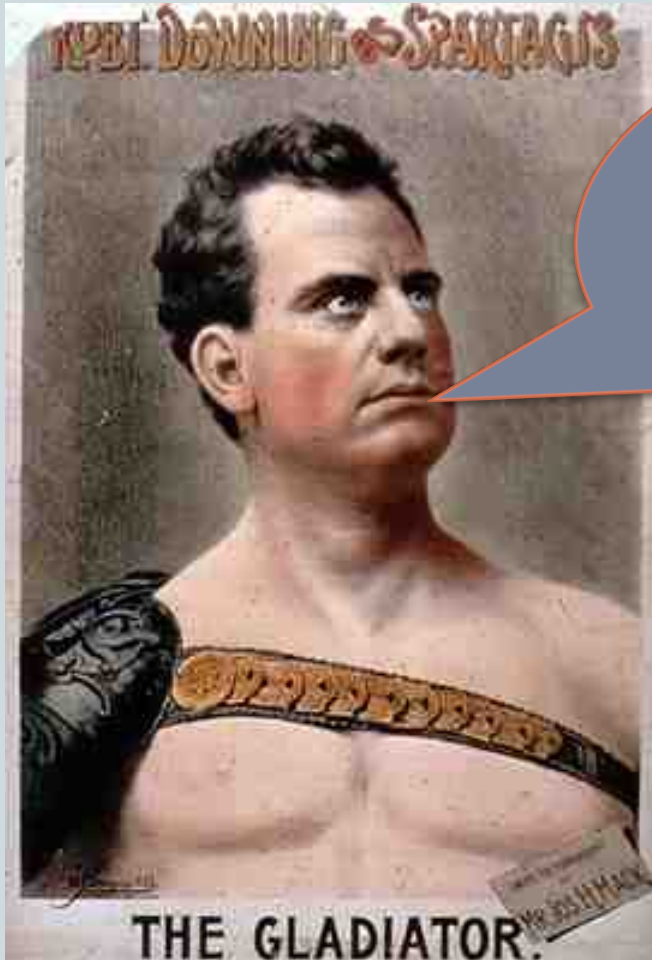
# Population Health development in East London



- National web based data on performance is available
- General practitioner has most influence on choice
- EHR data exchange is being implemented
- 50%+ patients are referred by digital channel
- 100% risk stratification of chronic disease in general practice

**An EHR exchange is developing**

# Connecting to people



Make it simple  
and structure  
your data