

Quality of UK TB Surveillance and Electronic Reporting Systems

Ibrahim Abubakar, PhD, FFPH

Head, Tuberculosis Section

Health Protection Agency

Outline

- The System
- The Quality Checks
- The Added Value
- The Problems
- The Future



1. System

- The national web based enhanced tuberculosis surveillance system
 - Rationale: To replace distributed Access based local, regional and national databases, improve timeliness, quality and reporting.
 - National expert group and consultation concluded that web based technologies will provide the best solution
 - Characteristics of the system
 - Case based (minimizes duplicate entry – moving to patient based)
 - Includes: treatment outcome, drug susceptibility and strain typing data
 - National coverage
 - Used primarily by clinical and admin staff in hospitals, regional coordinators and national team

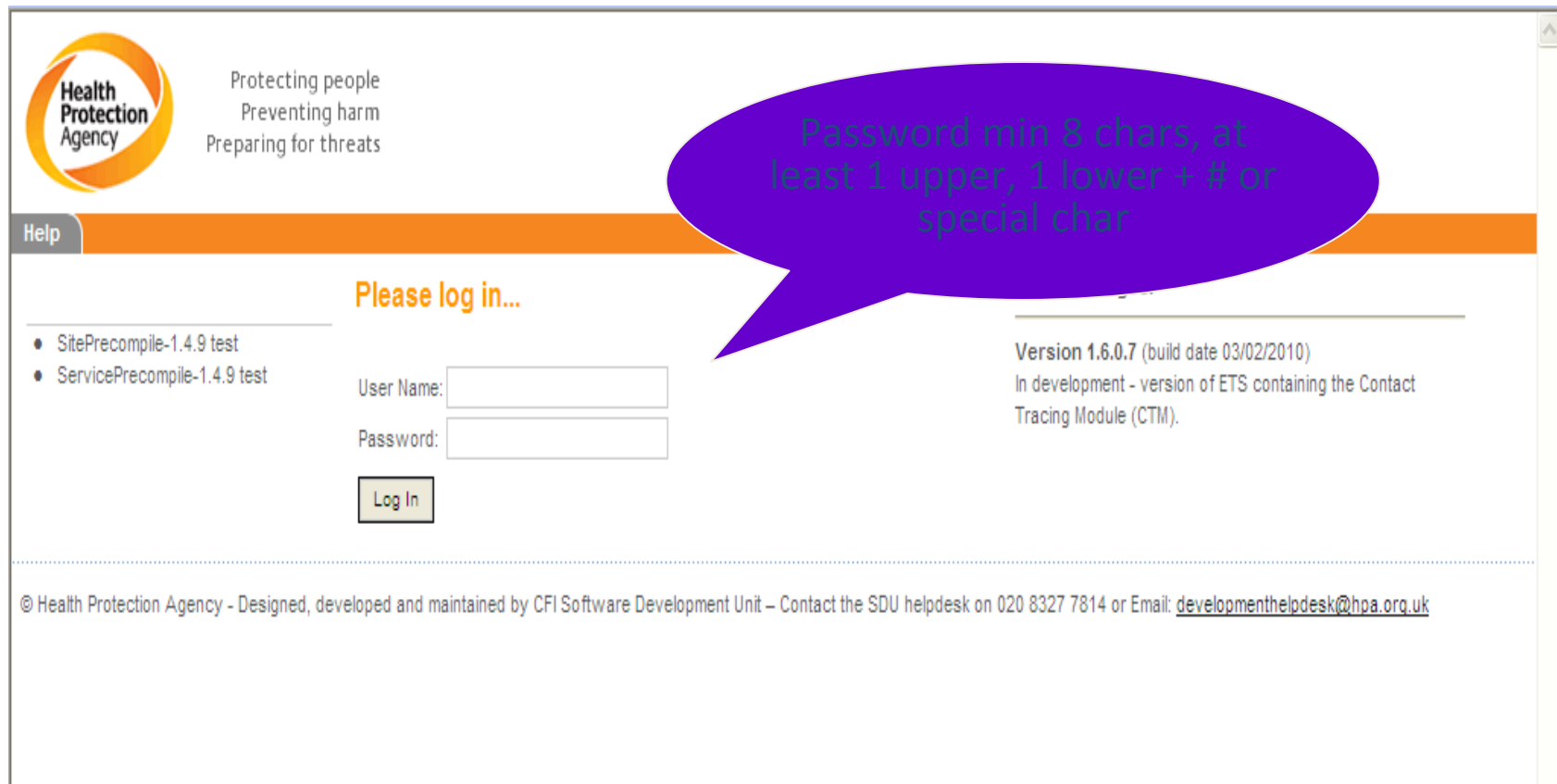
1. System: Development

In house team of developers using a variety of software development tools applied a modified waterfall approach:

- User specification
- Technical specification concurrent with initial development
- Coding
- Testing
- User acceptance testing
- National pilot with further changes as a result of lessons learnt

1. System

<https://10.190.223.145/ets.site/>



Health Protection Agency
Protecting people
Preventing harm
Preparing for threats

Help

Please log in...

- SitePrecompile-1.4.9 test
- ServicePrecompile-1.4.9 test

User Name:

Password:

Version 1.6.0.7 (build date 03/02/2010)
In development - version of ETS containing the Contact Tracing Module (CTM).

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Password min 8 chars, at least 1 upper, 1 lower + # or special char

1. System

Home page & Alerts



Protecting people
Preventing harm
Preparing for threats

Home page

Case management

Reports

Administration

Help

Home page

- New case
- Search for case
- Treatment outcome result due
- Case transfers
- Laboratory isolate matching

Logged in as: *csouthwood*

Log Out

- [Download paper data collection form](#)
- SitePrecompile-1.4.9 test
- ServicePrecompile-1.4.9 test

Cathy Southwood's home page

Alerts

Treatment outcome

- 7 treatment outcome reports due. [View](#)
- 43 six month treatment outcome reports possible. [View](#)
- 0 twenty four month treatment outcome reports due.

Case transfers

- 0 inbound transfers pending.
- 0 outbound transfers pending.
- 0 rejected outbound transfers pending.

Laboratory isolates

- 0 unmatched laboratory isolates available for matching.

1. System

Home page Case management Reports Administration Help

Entering a case: summary & submit

Home page Case management Reports Administration Help

Case management

- Demographics
- Patient Occupation
- Ethnicity & Origin
- Clinical Details
- Laboratory Results
- Risk Factors
- Treatment Planned
- Report Details
- Report Summary

Logged in as: csouthwood Log Out

- Download paper data collection form
- SitePrecompile-1.4.9 test
- ServicePrecompile-1.4.9 test

Id: 127313, Case notification date: 31/03/2010

Sex: N

Submit Case Delete Case

Report Summary

Transfer Access Rights Reprint NOIDS / case summary sheet

Patient Details

| | |
|------------------------|------------|
| Name | 1 |
| Address | 2, London, |
| NHS Number | |
| Date of birth | 9/04/19 |
| Age | |
| Sex | Male |
| Ethnic group | White |
| Country of birth | |
| Year of first UK entry | |
| Occupation | |

Case Summary

Please review and confirm that the following notification data is correct.

Confirm ☒ Leave box ticked to print NOIDS return / case summary sheet

Notification Details

| | |
|----------------------|----------------------------|
| Id | 127229 |
| Date of notification | 17/02/2010 |
| Case manager | Kentish, Lucy |
| Hospital | KENT & CANTERBURY HOSPITAL |
| Patient's consultant | Dr Baghai-Ravary |
| Primary Care Trust | Lewisham PCT (5LF) |

Episode Details

| | |
|----------------------------|-------------------------------|
| Previous diagnosis | Not known |
| Date of onset of symptoms | |
| Date of diagnosis | 18/12/2009 |
| Date of start of treatment | 25/01/2010 |
| Site(s) of disease | Pulmonary |
| Laboratory Results | Microscopy [Sputum]: Positive |

1. System: Reports

Home page Case management **Reports** Administration Help

Report builder

Select report criteria
Please select

Report builder

Select report criteria
Age

Please select

Select geographic criteria
Selected region

Select a region
London

Select a year
2009

Select a year span (if required)
2010

Select either residence or where treated
Residence

Create Report

Number of TB cases by Age Small Groups and Sex for the period 2005 - 2008 for the region London

| | | 2005 | 2006 | 2007 | 2008 | Total |
|---------------|---------|------|------|------|------|-------|
| 0 - 04 years | Female | 27 | 19 | 24 | 36 | 106 |
| | Male | 45 | 27 | 32 | 38 | 142 |
| 05 - 09 years | Female | 35 | 32 | 26 | 20 | 113 |
| | Male | 21 | 28 | 25 | 21 | 95 |
| 10 - 14 years | Female | 51 | 51 | 55 | 53 | 210 |
| | Male | 36 | 21 | 28 | 38 | 123 |
| 15 - 19 years | Female | 99 | 110 | 83 | 101 | 393 |
| | Male | 126 | 108 | 88 | 105 | 427 |
| 20 - 24 years | Female | 188 | 190 | | | |
| | Male | 228 | 225 | | | |
| 25 - 29 years | Female | 271 | 245 | | | |
| | Male | 315 | 287 | | | |
| | Unknown | 1 | 0 | | | |

Data Export

Only export data reported on or after:
01/01/2008

Only export data reported on or prior to:
28/02/2009

Export case data

Export laboratory isolate data

File Download

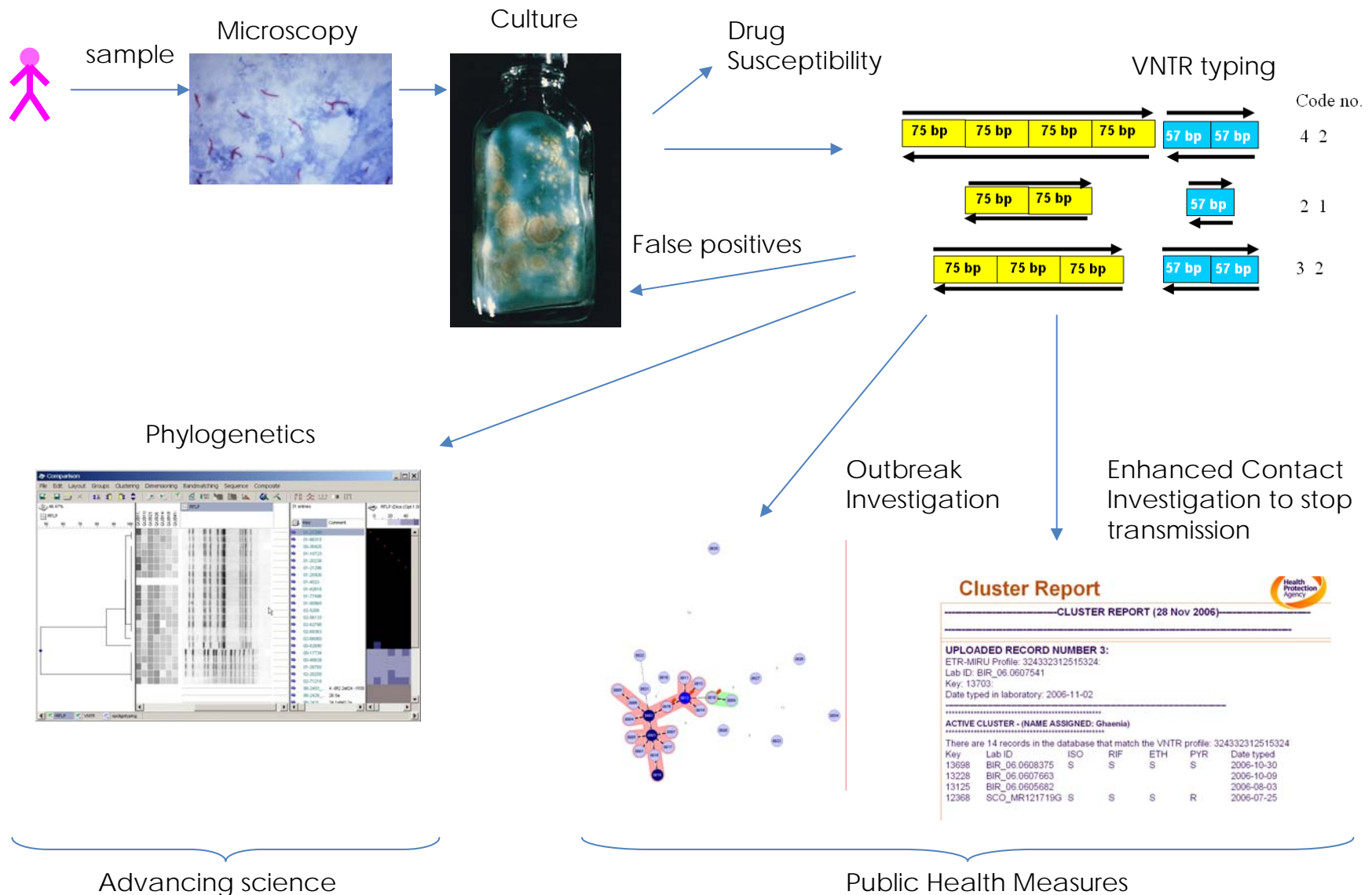
Do you want to open or save this file?

Name: ETSDDataDownload.xls
Type: Microsoft Excel Worksheet, 969KB
From: 10.190.223.145

Open Save Cancel

While files from the Internet can be useful, some files can potentially harm your computer. If you do not trust the source, do not open or save this file. [What's the risk?](#)

1. System: Strain Typing



2. Quality

Part of a centre wide quality assurance mechanisms towards ISO9001 certification = full quality system meeting key principles:

- Commitment of senior management
- Audits and evaluation
- Records allow tracing of problems
- Customer driven with feedback and complaints
- Development process documented with tests for quality and user satisfaction
- Quality improvement process
- System for dealing with poor performance

2. Quality

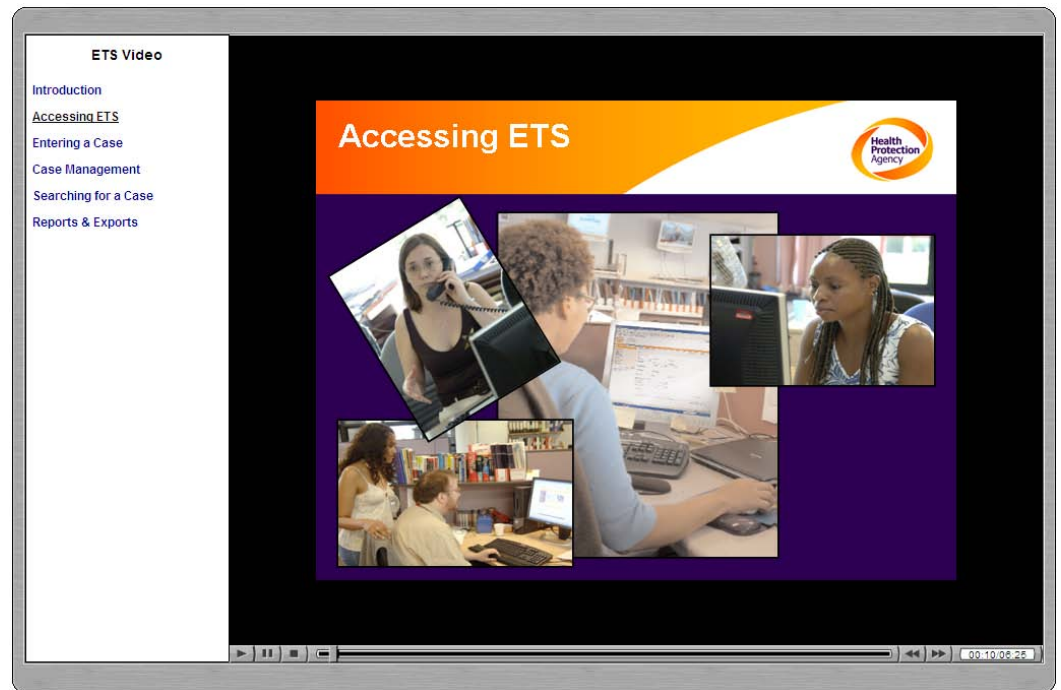
- Before Data Entry
 - Limiting error by training
 - Providing resources
 - Limiting error by pre-specifying possible entries
- During Data Entry
 - Validity checks (dates and logic)
 - Limiting error by specifying mandatory fields
 - Limiting error by including checks (NHS number)
 - Post code derived geographical fields (local authority etc)
 - Matching / cross checking
- After Data Entry - validation
 - TOM
 - Capture recapture
 - Audits

2. Quality

- Before Data Entry
 - Data dictionary
 - Training
 - Webcasts
 - Proving resources



Health Protection Agency
User Manual
Web Based Enhanced Tuberculosis Surveillance (ETS)
Version: November-2008



2. Quality

During: Limiting error by pre-specifying possible entries

Home page

Case management

Reports

Administration

Help

Case management

Demographics

▶ Patient Occupation

Ethnicity & Origin

Clinical Details

Laboratory Results

Risk Factors

Treatment Planned

Report Details

Report Summary

Logged in as: *csouthwood*

Log Out

- [Download paper data collection form](#)
- SitePrecompile-1.4.9 test
- ServicePrecompile-1.4.9 test

Id: 127313, Case notification date: 31/03/2010

Submit Case

Delete Case

Sex: N

Patient Occupation

Occupation category

Unknown

Please Select

Health care worker

Social service/prison sector worker

Laboratory/pathology

Agricultural/animal care worker

Education

None

Other

Unknown

Ethnicity & Origin

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2. Quality

During: Limiting error by pre-specifying possible entries

The screenshot displays a web application interface for case management. The top navigation bar includes links for Home page, Case management, Reports, Administration, and Help. The Case management section is active, showing a sidebar with links to Demographics, Patient Occupation, Ethnicity & Origin (selected), Clinical Details, Laboratory Results, Risk Factors, Treatment Planned, Report Details, and Report Summary. The main content area shows a case with ID 127313, notified on 31/03/2010. The Sex is listed as N. The Ethnicity & Origin section has a dropdown menu open, showing a list of countries and regions. The 'Born in the UK' section has radio buttons for Yes (selected), No, and Not known. The Patient Occupation section is partially visible. The bottom of the page shows the user is logged in as csouthwood and provides contact information for the Health Protection Agency.

Home page Case management Reports Administration Help

Case management

- Demographics
- Patient Occupation
- **Ethnicity & Origin**
- Clinical Details
- Laboratory Results
- Risk Factors
- Treatment Planned
- Report Details
- Report Summary

Logged in as: **csouthwood** Log Out

- Download paper data collection form
- SitePrecompile-1.4.9 test
- ServicePrecompile-1.4.9 test

Id: 127313, Case notification date: 31/03/2010 Submit Case Delete Case

Sex: N

Ethnicity & Origin

Ethnic group
White

Born in the UK

☒ Yes
☐ No
☐ Not known

◀ Patient Occupation

Please Select

- AFGHANISTAN
- ÅLAND ISLANDS
- ALBANIA
- ALGERIA
- AMERICAN SAMOA
- ANDORRA
- ANGOLA
- ANGUILLA
- ANTARCTICA
- ANTIGUA AND BARBUDA
- ARGENTINA
- ARMENIA
- ARUBA
- AUSTRALIA
- AUSTRIA
- AZERBAIJAN
- BAHAMAS
- BAHRAIN
- BANGLADESH
- BARBADOS
- BELARUS
- BELGIUM
- BELIZE
- BENIN
- BERMUDA
- BHUTAN
- BOLIVIA
- BOSNIA AND HERZEGOVINA
- BOTSWANA


Clinical details ▶

menthelpdesk@hpa.org.uk

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2. Quality

During: Limiting error by validity checks - dates



Protecting people
Preventing harm
Preparing for threats

Home pageCase managementReportsAdministrationStrain typingHelp

Home page

- Demographics
- Patient Occupation
- Ethnicity & Origin
- Clinical Details**
- Laboratory Results
- Risk Factors
- Treatment Planned
- Report Details
- Report Summary

Id: 141931, **Case notification date:** 02/11/2010
John Keats

Sex: M, **DoB:** 26/10/1910, **Age:** 100

Clinical Details

Date of onset of symptoms 01/03/2010 **Date first presented** **Date of diagnosis** 03/02/2010 **Date of start of treatment** **HIV test offered** No

Site(s) of disease

☐ Pulmonary ☐ Gastrointestinal / peritoneal ☐ Miliary
☐ Bone / joint: spine ☐ Genitourinary ☐ Pleural
☐ Bone / joint: other ☐ Intra-thoracic lymph nodes ☐ Other extra-pulmonary
☐ CNS: meningitis ☐ Extra-thoracic lymph nodes ☐ Unknown extra-pulmonary
☐ CNS: other ☐ Laryngeal ☐ Unknown
☐ Cryptic disseminated

Calendar

March 2010

| | | | | | | |
|----|----|----|----|----|----|----|
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | 1 | 2 | 3 | 4 |

Today None Mar 2010

Logged in as: dpedrazzoli Log Out


- Download paper data collection form
- SitePrecompile-1.4.9 test
- ServicePrecompile-1.7.0

Submit Case Delete Case

Navigation: Ethnicity & Origin Laboratory Results

2. Quality

During: Limiting error by validity checks - dates



Protecting people
Preventing harm
Preparing for threats

Home pageCase managementReportsAdministrationStrain typingHelp

Home page

- Demographics
- Patient Occupation
- Ethnicity & Origin
- Clinical Details**
- Laboratory Results
- Risk Factors
- Treatment Planned
- Report Details
- Report Summary

Id: 141931, **Case notification date:** 02/11/2010
John Keats

Sex: M, **DoB:** 26/10/1910, **Age:** 100

Submit Case **Delete Case**

Clinical Details

| Date of onset of symptoms | Date first presented | Date of diagnosis | Date of start of treatment | HIV test offered |
|---------------------------|----------------------|-------------------|----------------------------|------------------|
| 03/03/2011 | | | | No |

Date of onset of symptoms cannot be after date of case report (Report Details page). Please amend.

Logged in as: **dpedrizzoli** **Log Out**

- [Download paper data collection form](#)
- SitePrecompile-1.4.9 test
- ServicePrecompile-1.7.0

Site(s) of disease


| | | |
|---|--|--|
| <input type="checkbox"/> Pulmonary | <input type="checkbox"/> Gastrointestinal / peritoneal | <input type="checkbox"/> Miliary |
| <input type="checkbox"/> Bone / joint: spine | <input type="checkbox"/> Genitourinary | <input type="checkbox"/> Pleural |
| <input type="checkbox"/> Bone / joint: other | <input type="checkbox"/> Intra-thoracic lymph nodes | <input type="checkbox"/> Other extra-pulmonary |
| <input type="checkbox"/> CNS: meningitis | <input type="checkbox"/> Extra-thoracic lymph nodes | <input type="checkbox"/> Unknown extra-pulmonary |
| <input type="checkbox"/> CNS: other | <input type="checkbox"/> Laryngeal | <input type="checkbox"/> Unknown |
| <input type="checkbox"/> Cryptic disseminated | | |

◀ Ethnicity & Origin

Laboratory Results ▶

2. Quality

During: Limiting error by validity checks - dates



Protecting people
Preventing harm
Preparing for threats

Home pageCase managementReportsAdministrationStrain typingHelp

Home page

- Demographics
- Patient Occupation
- Ethnicity & Origin
- Clinical Details
- Laboratory Results
- Risk Factors
- Treatment Planned**
- Report Details
- Report Summary

Id: 141931, **Case notification date:** 02/11/2010
John Keats

Sex: M, **DoB:** 26/10/1910, **Age:** 100

Submit Case **Delete Case**

Treatment Planned

Tick here if the patient was diagnosed post-mortem

☒ Post-mortem

Date of death

05/01/2011

Date of death cannot be after date of diagnosis.

Logged in as: *dpedrazzoli* **Log Out**

[Download paper data collection form](#)

- SitePrecompile-1.4.9 test
- ServicePrecompile-1.7.0

Risk Factors

Report Details

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2. Quality

During: Treatment outcome reminders

Home page

Case management

Reports

Administration

Help

Case management

New case

Search for case

Treatment outcome result due

Case transfers

Laboratory isolate matching

Logged in as: csouthwood

Log Out

Download paper data collection form

SitePrecompile-1.4.9 test

ServicePrecompile-1.4.9 test

Treatment outcome due

The following cases started treatment between 31 March 2008 and 31 March 2009. To filter the list (by the date upon which each case was first due for report) enter date criteria in the boxes below and click on the button labelled 'Filter list by selected date criteria'. Note: leaving the 'Date from' box empty will automatically select the earliest date and leaving the 'Date to' box empty will automatically select the latest date.

Date from: -

Date to: -

Order table by report date

Order table by surname

Order table by hospital

Order table by case manager

| Id Reported | Patient | Consultant | Hospital | Case manager |
|---------------------|------------|-----------------|---|--------------|
| 86738 10/08/2009 | [REDACTED] | | DARENT VALLEY HOSPITAL | sblake |
| 75927 25/06/2009 | [REDACTED] | Dr Leonard | CONQUEST HOSPITAL | sblake |
| 70330 28/05/2009 | [REDACTED] | Dr R. Mankragod | MAIDSTONE DISTRICT GENERAL HOSPITAL | kgardiner |
| 62153 31/03/2009 | [REDACTED] | | MAIDSTONE DISTRICT GENERAL HOSPITAL | kgardiner |
| 62077 25/03/2009 | [REDACTED] | Dr Malamis | QUEEN ELIZABETH THE QUEEN MOTHER HOSPITAL | lkentish |
| 51075 03/02/2009 | [REDACTED] | | WILLIAM HARVEY HOSPITAL | lkentish |
| 51159 15/01/2009 | [REDACTED] | Dr West | MEDWAY MARITIME HOSPITAL | awebb |

Filter list by selected date criteria


Clear date filter

Print a paper TOM form for each case in list

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2. Quality

During: denotification



Protecting people
Preventing harm
Preparing for threats

Case Management | Reports | Administration | Help

Treatment Outcome Monitoring

Denotify Case

Did the patient complete a full course of therapy within 12 months of starting treatment?

☐ Yes, the patient completed a full course of therapy

☒ No, the patient did not complete a full course within 12 months

☐ The patient's care was transferred to another clinic

☐ The patient was lost to follow-up before the end of treatment

☐ Unknown (treatment details are unavailable for this patient)

Please identify the circumstances for incomplete treatment

☒ Treatment stopped - Patient subsequently found not to have TB (including atypical mycobacterial infection)

☐ Treatment stopped - but patient had TB

☐ Patient died before or while on treatment

☐ Planned course of treatment exceeds 12 months

☐ Planned course of treatment interrupted

☐ Planned course of treatment changed

☐ No treatment details available

☐ The patient's care was transferred to another clinic

Please select as appropriate:

Atypical Mycobacterium identified.

| | | |
|--|---------------------------------------|---|
| <input type="checkbox"/> M. abscessus | <input type="checkbox"/> M. gordonae | <input type="checkbox"/> M. peregrinum |
| <input type="checkbox"/> M. avium-intracellulare | <input type="checkbox"/> M. kansasii | <input type="checkbox"/> M. xenopi |
| <input type="checkbox"/> M. chelonae | <input type="checkbox"/> M. malmoense | <input type="checkbox"/> Other atypical |
| <input type="checkbox"/> M. fortuitum | <input type="checkbox"/> M. marinum | |

Other disease identified:

☐

Please denotify this case by entering a date below and submitting the outcome.

Denotified date

2. Quality: Assessing completeness

- “Inventory Method”: Record linkage
 - Comparison of laboratory and clinical reports
 - TB-HIV matching
 - Bespoke audits: British Paediatric Surv Unit
 - HIV
 - Mortality
 - Hospitalisation
 - Biologics Register
- Capture Recapture
 - Overall data
 - Mortality

2. Quality: Validation

- Audits and surveillance evaluation:
completing the loop by going back to clinics

- User Feedback System

| Enhanced TB Surveillance System - User Feedback Form | |
|--|----------------------------------|
| HEALTH PROTECTION AGENCY | |
| FEEDBACK FORM ID [][] | |
| ENHANCED TUBERCULOSIS SURVEILLANCE SYSTEM | |
| USER FEEDBACK FORM | |
| 1.1 Date | DD-MM-YYYY: [][]-[][]-[][] |
| 1.2 Your name (optional) | [] |
| 1.3 Current Position | [] |
| 1.4 Place of work | |
| Clinic | [] |
| PCT | [] |
| HPU | [] |
| Region | [] |
| 1.5 Please provide your comments in the space below: | |

2. Quality: Mandatory Fields

| Region/Country | Data Field - Proportion Completed | | | | | | | | | | | | |
|-------------------------------------|-----------------------------------|------|-----|--------------|----------------------|---------------|---------------------|--------------------|--------------------|-----------------------|----------------------------|----------------------|------------------|
| | Postcode | Name | Sex | Ethnic group | Date of notification | Date of birth | Born/not born in UK | Previous treatment | Start of treatment | Previous TB diagnosis | Treatment outcome reported | Sputum smear status* | Site of disease† |
| East Midlands | 99 | 100 | 99 | 93 | 100 | 99 | 90 | 80 | 84 | 83 | 86 | 55 | 98 |
| East of England | 100 | 100 | 97 | 94 | 100 | 100 | 90 | 83 | 91 | 86 | 93 | 28 | 99 |
| London | 100 | 100 | 100 | 98 | 100 | 100 | 94 | 88 | 93 | 91 | 100 | 75 | 100 |
| North East | 100 | 100 | 98 | 99 | 100 | 100 | 67 | 82 | 86 | 86 | 96 | 59 | 100 |
| North West | 100 | 100 | 99 | 99 | 100 | 100 | 92 | 88 | 91 | 90 | 82 | 49 | 99 |
| Northern Ireland | 91 | 100 | 100 | 93 | 100 | 100 | 68 | 84 | 77 | 87 | 92 | 79 | 99 |
| Scotland | NA | NA | 100 | 86 | 100 | NA | 75 | 80 | NA | 82 | 85 | 74 | 100 |
| South East | 99 | 100 | 99 | 92 | 100 | 100 | 91 | 85 | 92 | 86 | 94 | 44 | 99 |
| South West | 98 | 100 | 98 | 83 | 100 | 100 | 79 | 75 | 77 | 77 | 84 | 50 | 91 |
| Wales | 97 | 100 | 97 | 92 | 100 | 100 | 88 | 76 | 83 | 80 | 95 | 33 | 100 |
| West Midlands | 98 | 100 | 100 | 97 | 100 | 100 | 93 | 53 | 90 | 75 | 99 | 43 | 99 |
| Yorkshire and The Humber | 98 | 100 | 99 | 94 | 100 | 100 | 89 | 88 | 87 | 91 | 95 | 45 | 99 |
| England, Wales and Northern Ireland | 99 | 100 | - | - | - | 99 | - | - | 89 | - | - | - | - |
| Whole of UK | - | - | 99 | 95 | 100 | - | 91 | 83 | - | 87 | 95 | 58 | 99 |
| Target for completeness | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | - | 95 | 95 | 95 |

2. Quality: Timeliness

- Assessing timeliness: annual audit of reporting dates against national standards
- Improving timeliness
 - High priority identified nationally
 - Use of web-based system – however.....
 - Cleaning, validation, record linkage, audits take a lot of time

3. The Added Value

- Keeping stakeholders assured
- More confidence in policy
- Makes compliance with ISO9001 easier

4. The Problems/caveats

- Development process tedious: bugs and dealing with user feedback
- Routine electronic checks often require human follow up of inconsistencies
- Systems are only as good as what you have pre-specified
- It is time and resource intensive to do properly
- Dealing with perception

5. The Future: Contact Tracing

Search records for
Mrs Betty RUBBLE (Person ID: 9)

Search for Records Add New Contact

| Person ID | Forename | Surname | Date of Birth | Sex | Screening Period | Screening Group / Index Case |
|-----------|----------|---------|---------------|--------|------------------|------------------------------|
| 9 | Betty | RUBBLE | | Female | 1 | Screening Group |

Goto Record Add Screening Period for Selected Person

Searching for a record

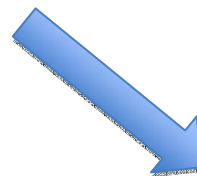


Search records for
Mrs Betty RUBBLE (Person ID: 9)

Mr Barney RUBBLE
Person ID: 1, Date of Birth: Not available, Sex: Male

Mrs Betty RUBBLE
Person ID: 3, Date of Birth: Not available, Sex: Female

Finding a record



Person ID: New Screening Period: New Screening Group / Index Case: Not Assigned

Demographics Health Care Providers Contact Assessment 1 Assessment 2 Investigation Final Outcome

Name, Age, Sex, Primary Residence and Contact Numbers

Surname Forename(s) Title
Other Names Date of Birth Age Sex
Address Day Tel No.
Town or City Other Tel No.
County Other Contact Method
Postcode PCT of Residence
LA of Residence

Ethnicity, Country of Birth and Occupations
NHS Number and Other ID's
Details of Death

Print Record Save changes to this record Cancel changes to this record

Or enter a record

Enter demographic data

The screenshot shows the 'TB Record' web application with the 'Demographics' tab selected. The 'Ethnicity, Country of Birth and Occupations' section is active. A dropdown menu for 'Birth Country' is open, displaying a list of countries including Afghanistan, Albania, Algeria, American Samoa, Andorra, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Cayman Islands, Central African Republic, Chad, Chile, China, Christmas Island, Cocos (Keeling) Islands, Colombia, Costa Rica, Cote d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Polynesia, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Greenland, Grenada, Guadeloupe, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran (Islamic Republic of), Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea (Democratic), Korea (Republic of), Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia (Federated States of), Moldova, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Rwanda, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sri Lanka, Sudan, Suriname, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States of America, Uruguay, Uzbekistan, Vanuatu, Venezuela (Bolivarian Republic of), Vietnam, Virgin Islands (British), Virgin Islands (U.S.), Wallis and Futuna, and Yemen. The 'Save changes to this record' button is visible at the bottom.

NHS number

The screenshot shows the 'TB Record' web application with the 'Demographics' tab selected. The 'NHS Number and Other ID's' section is active. It contains a text input field for 'NHS Number' and three pairs of input fields for 'ID Type' and 'ID'. The 'Details of Death' section is also visible below. The 'Save changes to this record' button is visible at the bottom.

Contact data

The screenshot shows the 'TB Record' web application with the 'Contact' tab selected. The 'Contact Type' section is active. It contains a 'Type of contact' section with 'Household' and 'Non Household' checkboxes. Below it, a dropdown menu for 'Relationship of index case to contact' is open, displaying a list of relationships including Partner / Spouse, Father, Mother, Sibling, Grandparent, Child minder, Visiting Relative, Resident Relative, and Other. The 'Save changes to this record' button is visible at the bottom.

The screenshot shows the 'TB Record' web application with the 'Contact' tab selected. The 'Contact Type' section is active. It contains a 'Setting category' dropdown menu which is open, displaying a list of categories including Health care, Education, Detention, Homeless, Other congregate living settings, Travel, Workplace/social, and Other. The 'Save changes to this record' button is visible at the bottom.

Symptoms, BCG, Travel and TB history

TB Record

158.119.166.45:81/TBRecord/Screening/0/0

Person ID: New Screening Period: New Screening Group / Index Case: Not Assigned

Demographics Health Care Providers Contact **Assessment 1** Assessment 2 Investigation Final Outcome

Symptoms

Date of visit: 02-Feb-2011 Symptoms ☒ Yes ☐ No

Cough ☒ Yes ☐ No Duration: 3 week(s) ☒ week(s) ☐ day(s) weight loss ☒ Yes ☐ No Duration: 2 week(s) ☒ week(s) ☐ day(s)

night sweats ☐ Yes ☒ No Duration: week(s) ☒ week(s) ☐ day(s) fever ☐ Yes ☐ No Duration: week(s) ☒ week(s) ☐ day(s)

haemoptysis ☐ Yes ☒ No Duration: week(s) ☒ week(s) ☐ day(s) other: Duration: week(s) ☒ week(s) ☐ day(s)

BCG Details

Travel Details

History of TB

Print Record Save changes to this record Cancel changes to this record

TB Record

158.119.166.45:81/TBRecord/Screening/0/0

Person ID: New Screening Period: New Screening Group / Index Case: Not Assigned

Demographics Health Care Providers Contact **Assessment 1** Assessment 2 Investigation Final Outcome

Symptoms

BCG Details

BCG scar ☒ Yes ☐ No Seen on date:

Documented evidence of BCG vaccination ☒ Yes ☐ No Seen on date:

Reliable history of vaccination ☒ Yes ☐ No Reported on date:

Year of BCG: 1972 or at birth ☐

Travel Details

History of TB

Print Record Save changes to this record Cancel changes to this record

TB Record

158.119.166.45:81/TBRecord/Screening/0/0

Person ID: New Screening Period: New Screening Group / Index Case: Not Assigned

Demographics Health Care Providers Contact **Assessment 1** Assessment 2 Investigation Final Outcome

Symptoms

BCG Details

Travel Details

Travel to high-incidence countries for more than 1 month during the last 2 years ☒ Yes ☐ No Date: Place: Duration:

Details of travel to an endemic country:

Stayed with relatives in TB endemic countries in the last 2 years ☒ Yes ☐ No Date: Place: Duration:

Details:

History of TB

Print Record Save changes to this record Cancel changes to this record

TB Record

158.119.166.45:81/TBRecord/Screening/0/0

Person ID: New Screening Period: New Screening Group / Index Case: Not Assigned

Demographics Health Care Providers Contact **Assessment 1** Assessment 2 Investigation Final Outcome

Symptoms

BCG Details

Travel Details

History of TB

Previous contact with TB ☐ Yes ☐ No ☐ Unknown

Previous screening for TB ☐ Yes ☐ No ☐ Unknown

Previous TB diagnosis ☒ Yes ☐ No ☐ Unknown Year: Details:

Was the patient treated with at least 1 month of drug therapy ☒ Yes ☐ No ☐ Unknown Details:

Previous treatment for LTBI ☐ Yes ☐ No ☐ Unknown

Print Record Save changes to this record Cancel changes to this record

Clinical risk factors

TB Record

158.119.166.45:81/TBRecord/Screening/0/0

Person ID: New Screening Period: New Screening Group / Index Case: Not Assigned

Demographics Health Care Providers Contact Assessment 1 **Assessment 2** Investigation Final Outcome

Clinical Risk Factors

| | | | |
|-------------------------------|---|---|---|
| HIV-positive | <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown | Chronic renal failure or received haemodialysis | <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown |
| Solid organ transplantation | <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown | Gastrectomy | <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown |
| Haematological malignancy | <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown | Diabetes | <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown |
| Jejunoileal bypass | <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown | Silicosis | <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown |
| Anti-TNF-alpha treatment | <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown | | |
| Other immunosuppressive drugs | <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown | | |

Print Record Save changes to this record

Social risk factors

TB Record

158.119.166.45:81/TBRecord/Screening/0/0

Person ID: New Screening Period: New Screening Group / Index Case: Not Assigned

Demographics Health Care Providers Contact Assessment 1 **Assessment 2** Investigation Final Outcome

Social Risk Factors

Does the patient have a history of problem drug use? ☒ Yes ☐ No ☐ Not known ☐ Within last month ☐ Between 1 month and 5 years ago ☐ Over 5 years ago

Is the patient currently homeless or have they ever been homeless? ☒ Yes ☐ No ☐ Not known ☐ Currently ☐ In the last 5 years ☐ Over 5 years ago

Has the patient ever been in prison? ☒ Yes ☐ No ☐ Not known ☐ Currently ☐ In the last 5 years ☐ Over 5 years ago

Alcohol misuse? ☒ Yes ☐ No ☐ Not known

Mental Health Concerns? ☒ Yes ☐ No ☐ Not known

History of Smoking ☒ Passive ☐ Active ☐ None

Print Record Save changes to this record Cancel changes to this record

Investigation

TB Record

158.119.166.45:81/TBRecord/Screening/0/0

Home Search Logoff

Person ID: New Screening Period: New Screening Group / Index Case: Not Assigned

Demographics Health Care Providers Contact Assessment 1 Assessment 2 **Investigation** Final Outcome

▶ Mantoux Tests

▶ **Interferon-γ Tests**

Interferon-γ test done ☒ Yes ☐ No Date 09-Feb-2011 Test type QuantIFERON-TB Gold TB Antigen ☐

Test result Negative Positive control ☐ Negative control ☐

Date 11-Feb-2011 Test type T-SPOT.TB TB Antigen ☐

Test result -- Please Select -- Positive control ☐ Negative control ☐

Date Test type QuantIFERON-TB Gold TB Antigen ☐

Test result -- Please Select -- Positive control ☐ Negative control ☐

Microscopies, Cultures and Histologies

Chest X-rays

Other Blood Tests

Print Record Save changes to this record

TB Record

158.119.166.45:81/TBRecord/Screening/0/0

Home Search Logoff

Person ID: New Screening Period: New Screening Group / Index Case: Not Assigned

Demographics Health Care Providers Contact Assessment 1 Assessment 2 **Investigation** Final Outcome

▶ Mantoux Tests

▶ Interferon-γ Tests

▶ **Microscopies, Cultures and Histologies**

Microscopy done ☒ Yes ☐ No Date 01-Feb-2011 Specimen Type Bronchial washings Result Negative

Date 02-Feb-2011 Specimen Type Peritoneal fluid Result Positive

Date 03-Feb-2011 Specimen Type Peritoneal fluid Result -- Please Select --

Culture done ☒ Yes ☐ No Date Specimen Type -- Please Select -- Result -- Please Select --

Histology done ☒ Yes ☐ No Date Specimen Type -- Please Select -- Result -- Please Select --

Chest X-rays

Other Blood Tests

Print Record Save changes to this record Cancel changes to this record

Outcomes and quality checks

The screenshot shows the 'TB Record' application interface. The browser address bar displays '158.119.166.45:81/TBRecord/Screening/0/0'. The top navigation bar includes 'Home', 'Search', and 'Logoff' links. Below this, a status bar shows 'Person ID: New', 'Screening Period: New', and 'Screening Group / Index Case: Not Assigned'. The main content area has a tabbed interface with 'Final Outcome' selected. A dropdown menu is open, showing the following options: '-- Please Select --', '-- Please Select --', 'Active TB - treatment completed', 'Active TB - treatment stopped', 'Active TB - lost to follow up', 'Latent TB - treatment completed for LTBI', 'Latent TB - treatment stopped', 'Latent TB - lost to follow up', 'No evidence of LTBI - chemoprophylaxis completed, no BCG given', 'No evidence of LTBI - chemoprophylaxis completed, BCG given', 'No evidence of LTBI - chemoprophylaxis stopped, no BCG given', and 'No evidence of LTBI - chemoprophylaxis stopped, BCG given'. At the bottom right, there are 'Print Record' and 'Save changes' buttons.

The screenshot shows the 'TB Record' application interface with a 'Record Validation' dialog box open. The browser address bar displays '158.119.166.45:81/TBRecord/Screening/0/0'. The top navigation bar includes 'Home', 'Search', and 'Logoff' links. Below this, a status bar shows 'Person ID: New', 'Screening Period: New', and 'Screening Group / Index Case: Not Assigned'. The main content area has a tabbed interface with 'Demographics' selected. The 'Demographics' tab shows fields for 'Surname', 'Forename(s)', 'Title', 'Other Names', 'Date of Birth', 'Age', 'Sex', 'Address', 'Town or City', 'County', and 'Postcode'. The 'Record Validation' dialog box lists the following errors: 'Demographics - Surname is a mandatory field', 'Demographics - Forename(s) is a mandatory field', 'Demographics - Postcode is a mandatory field', 'Demographics - Ethnicity is a mandatory field', and 'Health Care Providers - Case Manager is a mandatory field'. A 'Return to record' button is at the bottom of the dialog. At the bottom right of the application, there are 'Print Record', 'Save changes to this record', and 'Cancel changes to this record' buttons.

5. The Future

- Operating within a more resource constrained set up with raised expectations
- Need to meet the needs of other stakeholders
 - research
- Adding further functionality and reporting functions