“Outbreak”: fully integrated, real-time detection, diagnosis and control of diarrhoeal disease clusters in the community

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VISION

- To create a new, one-health paradigm for detecting and investigating clusters and outbreaks of diarrhoea and vomiting in the community
  - New approach to population sampling
  - New approach to cluster detection
  - Modern microbiological methods
    - Clinical diagnostics
    - Putative pathogen discovery
  - Integration with veterinary surveillance systems

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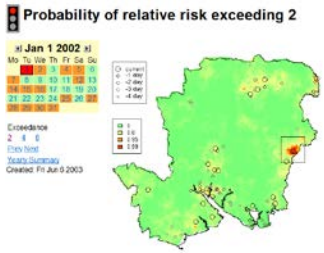
WHAT DO WE PROPOSE?

Real-time updating

Within the day

Public Health England



Within the day

Whole genome sequencing

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WHAT TECHNOLOGIES ARE INVOLVED?

- Cluster detection system
  - Ascertainment and Enhancement of Gastrointestinal Surveillance and Statistics (AEGISS)
- Molecular diagnostics
  - Luminex xTAG Gastrointestinal Pathogen Panel (xTAG GPP)
- Microbial genomics
- Small Animal Veterinary Surveillance Network (SAVSNET)
- Livestock surveillance data (AHVLA)

WHO IS INVOLVED?

Royal College of General Practitioners

Public Health England

Cumbria & Lancashire

LANCASTER UNIVERSITY

Lancashire Teaching Hospitals NHS
NHS Foundation Trust

The Royal Liverpool and Broadgreen University Hospitals NHS
NHS Trust

Greater Manchest

Public Health England

Central Manchester University Hospitals NHS
NHS Foundation Trust

Public Health England

Public Health England

Cheshire & Merseyside

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AHVLA
Animal Health and Veterinary Laboratories Agency

PRIFYSGOL BANGOR UNIVERSITY

SAVSNET

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Luminex

MODERN MICROBIOLOGY: THE CHALLENGE

- We are using a multiplex RT-PCR to detect and identify multiple pathogens simultaneously using a commercially available CE marked kit (Luminex xTAG® Gastrointestinal Pathogen Panel (xTAG GPP).

- We are employing microbial genomics in a targeted fashion:-

  (a) for putative pathogen discovery (negative stool samples);

  (b) for typing and monitoring the evolution of pathogens (positive stool samples) i.e. detecting changes in virulence markers including antimicrobial resistance;

  (c) design rapid diagnostic tests for new pathogens (for diagnostics, epidemiological surveillance and source attribution).

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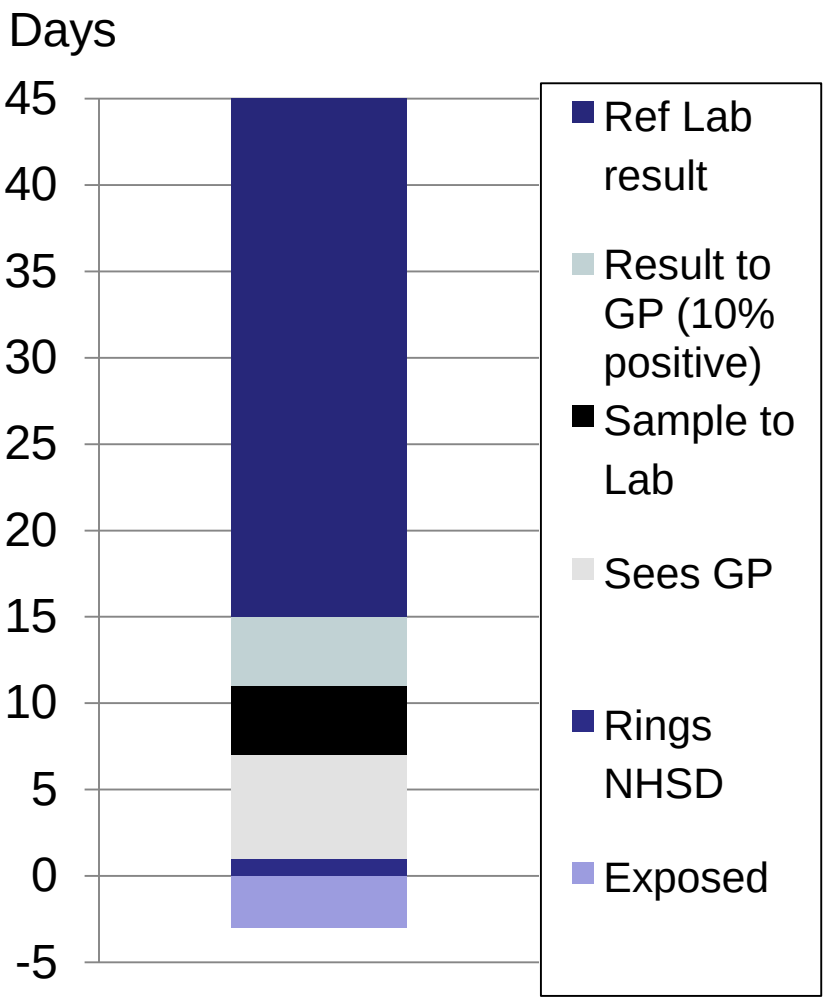
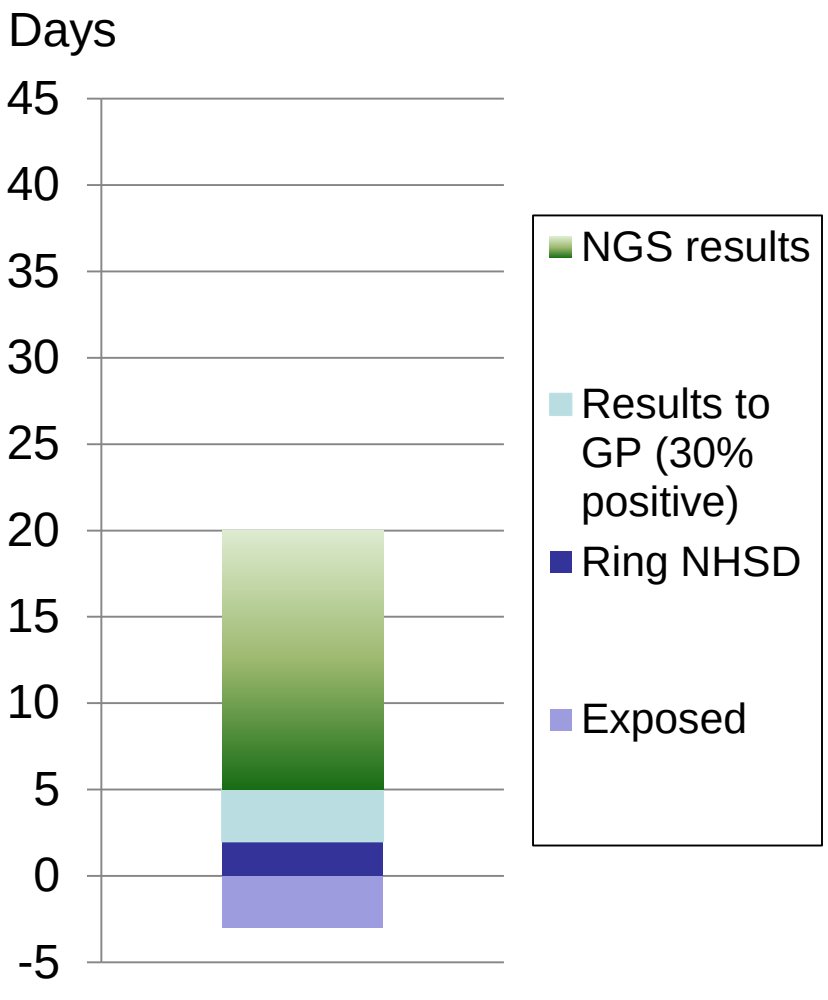
HOW WILL THIS HELP?

Current System



Proposed system



PROGRESS TO DATE

- Two additional assays to run alongside Luminex xTAG GPP
  - Sapovirus
  - Enteroaggregative *E. coli*
- Protocols for:-
  - Putative pathogen discovery
  - Health economics evaluation
  - Process evaluation
- Recruitment of primary care teams
- Ethics!
- Pilot
- Running live from 01/02/2015

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WHAT ARE THE MAIN CHALLENGES?

- Developing a bioinformatics pipeline to convert sequence data into a format that can be easily understood and acted upon by clinicians and health professionals.
- Ensuring that frontline clinicians and health protection professionals adopt the new system.

A PATHFINDER PROJECT WITH WIDER APPLICATIONS

- Clinical syndromes
  - Respiratory symptoms
  - Sepsis
- New technologies
  - Incorporate in a modular fashion as they come on stream
- Geographical scalability
  - Local – Regional – National
- Settings
  - Community
  - Hospital

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