New technology: Here to improve our impact or bury us in work?

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Public Health Wales

Overview

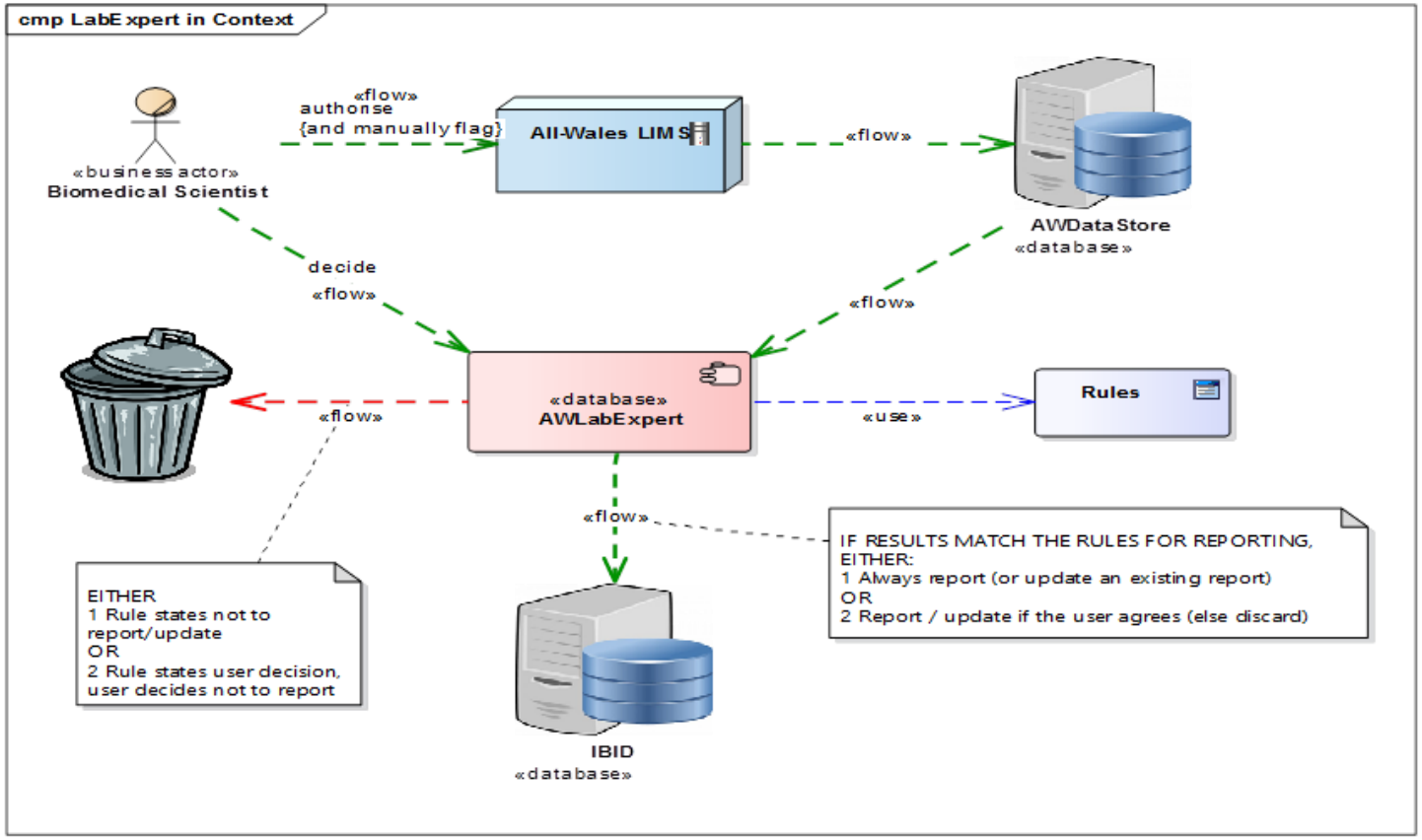
Challenges for local authorities

Two new technological developments and one service change focussed on today:

- Tarian – an integrated, shared case and incident management system
- Molecular diagnostics for enteric pathogens
- Whole genome sequencing

Tarian

Integrated case and incident management system



Tarian

This is great…

- First time there has been a shared all Wales record
- Improved reporting functionality
- Ability to contribute to ‘big data’
- Facilitates sharing confidential information
- Can allocate tasks to other agencies (or people)

Tarian

This is great…isn't it?

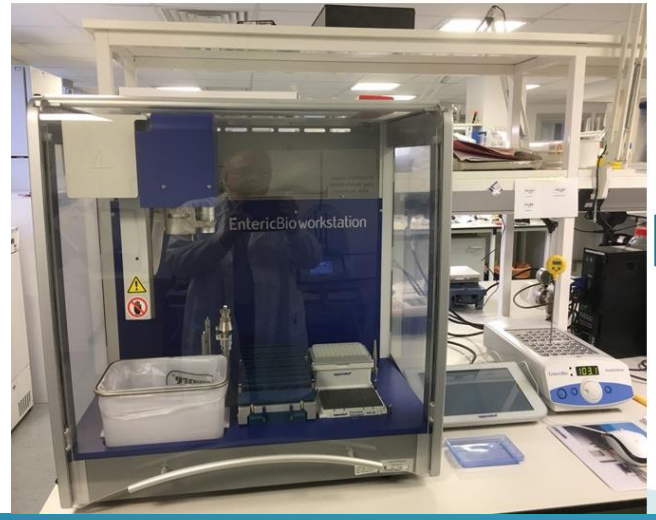
- We have had to standardise our approach across Wales
- Electronic records don't necessarily mean less time spend updating them
- Some of the information you record may not be of direct relevance
- Not friendly for remote working…yet
- What of it fails?

Molecular diagnostics for enteric pathogens

What is it?

Traditionally…

Now…



Molecular diagnostics for enteric pathogens

Process

Routine screen

Samples received and prepared

1. 1st run – C difficile; Norovirus
2. 2nd run – Campylobacter, Cryptosporidium; Giardia; Salmonella; Shigella; VTEC
3. If DNA/RNA of a target organism is found then the laboratory test for that organism only

Don't forget, this is currently only available through PHW laboratories.

Additional screen

If the submission form includes reference to 'food poisoning' or foreign travel then additional target organisms are tested for

Also the laboratory can expand the tests or investigate additional causes depending on the type of illness or the clinicians information

Molecular diagnostics for enteric pathogens

This is great…

Public Health Wales laboratories implementing molecular testing for enteric pathogens (usually managed by local authorities)

- Improved turn around times (receipt to result authorisation)
- Norovirus now tested locally
- Improved sensitivity (in some cases greatly improved)
- Less resource intensive for the laboratory
  - Labs now mainly only try to grow what they have evidence is there

Table 1. Hospital turnaround times, comparing PCR with traditional culture-based methods (prePCR).

% Cumulative turnaround times	Aberystwyth PCR	Bangor PCR	Cardiff PCR	Carmarthen PCR	Rhyl PCR	Swansea PCR	Wrexham PCR
<1 day	42.4	4.8	21.5	3.9	21.9	67.5	3
1-2 days	98.8	91.3	79.4	41.7	93.8	99.3	89.1
2-3 days	100	99.2	89.3	97	100	100	98
3-4 days		99.2	96	99.5			99
4-5 days		100	99.7	99.5			
5-6 days			99.9	99.8			
6-7 days			99.9	100			
7-8 days			100				
n	(172)	(126)	(1161)	(432)	(146)	(1471)	(100)

% Cumulative turnaround times	Aberystwyth prePCR	Bangor prePCR	Cardiff prePCR	Carmarthen prePCR	Rhyl prePCR	Swansea prePCR	Wrexham prePCR
<1 day	1.2	0.9	0	0.5	0.4	0.4	0.2
1-2 days	1.9	0.9	1.1	1.7	0.4	0.5	1
2-3 days	84.6	74.5	68.3	86.7	73.4	84.9	71.3
3-4 days	98.8	97.4	97.1	98.6	96.3	92.9	97.1
4-5 days	99.4	99.1	99	99.5	99.6	95.2	100
5-6 days	100	99.1	99.6	100	100	95.3	
6-7 days		99.1	99.8			99.9	
7-8 days		99.6	100			100	
n	(162)	(231)	(1128)	(421)	(516)	(1528)	(513)
		100% @ 14-21 days					

Molecular diagnostics for enteric pathogens

This is great…isn't it?

It is certainly an improvement but you need to be prepared

- Will result in increased workload
- Will require earlier response in some instances
- New organisms identified
- Operates seven days a week
- Development of Officers required
  - New terminology
  - Complex follow up

Molecular diagnostics for enteric pathogens

Likely increased workload

Organism	Numbers reported	Considerations
Campylobacter	+50%	Resource implications. 3673 Campylobacters reported during 2017 (Tarian 2/1/18)
Salmonella	+slightly	Serotyping for typhi / paratyphi will be the same as now
Shigella	+slightly	Increase in shigella, but also test cannot distinguish from entero-invasive E coli (not VTEC). Further culture required
E coli O157	++	Test will identify VTEC not O157. Further culture required
Cryptosporidium	~	Limited / no improved sensitivity
Giardia	+100-500%	Molecular test far more sensitive than current methods
C difficile / Norovirus	+slightly	Existing testing algorithms to remain unchanged however expect increase in positives

Molecular diagnostics for enteric pathogens

Unforeseen circumstances?

- We only have some of the information required to follow up
- Results are available within hours but a Doctor has 3 days to give you / us any information (unless urgent)
- The results are 'Detected/Not detected' but they are not necessarily easy to interpret

medical/clinical needs v public health needs

- Purpose of the sample
  - What is the Doctor investigating?
  - They only have to notify **food** poisoning, **infectious** bloody diarrhoea etc

Whole Genome Sequencing

Improved laboratory techniques

Developments in reference laboratories – primarily PHE Colindale

- Molecular diagnostics look for a single gene that identifies an organism (or two)
- Whole genome sequencing identifies the genetic makeup of an organism and compares it to others
- Opens up new opportunities to identify clusters / outbreaks

Impact

This really is great

- These developments enable your routine work to contribute to the national picture
- Tests are now more sensitive with fewer ‘false negatives’
- Officers can take action quicker, against more organisms
- We can communicate better and in a more secure manner
- Data collated gives opportunity for more analysis beto carried out, feeding back into targeted practice

Impact

There are challenges

- These are the biggest developments in health protection services for the last 15 years(?)
- Need to change our approach to common (and uncommon) pathogens
- Greater need to assess the risks and tailor action/advice
- Look at training requirements
- There are undoubtedly resource implications, but this is your job

Impact

Resilience and availability

Remember, local authorities are central to any infectious disease response under the all Wales Communicable Disease Outbreak Plan

All local authorities must ensure they have sufficient trained, competent and available staff/resources

- Work with Public Health Wales Proper Officers to ensure each local authority can mount an effective response
- Consider how you would respond in a timely manner with sufficient resources

Thank you for listening.
Any questions?