One route to efficiency:
National investment in infection surveillance

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Amid calls such as that of Lord Carter[i] for greater labour efficiency, standardisation of practices and better outcomes in UK healthcare, Wales may have one answer: A national system of electronic monitoring of healthcare-associated infections (HCAIs).

Surveillance is seen as the cornerstone of effective infection prevention and control practice[ii,iii,iv] and has traditionally been a repetitive, time-consuming, manual review of computerised microbiology reports, coupled with other laboratory and patient care information extracted from a variety of sources. Copied and pasted into spreadsheets, this raw data does not easily translate into analytics or improved processes of care, and the data entry is often error-prone as it relies on individual staff members to recognise patterns that may indicate infection transmission.

Wales have adopted a new system called ICNet Clinical Surveillance Software that automates this process, instantly mining data from a range of disparate sources, analysing it and presenting it in

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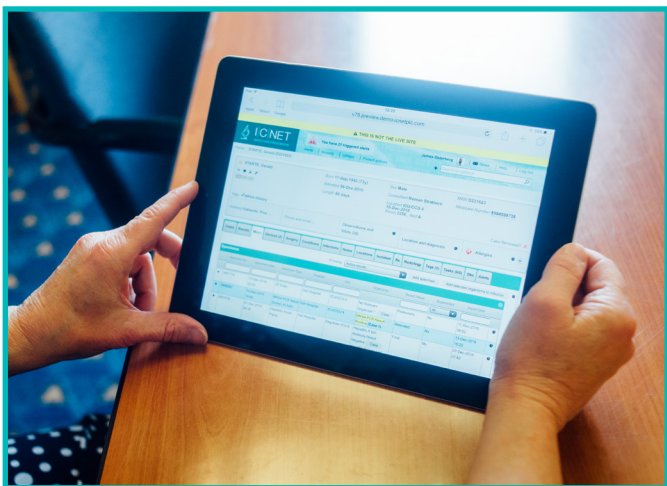
an organised manner. As we have found in an initial rollout of the system at Betsi Cadwaladr University Health Board, North Wales, users – infection prevention and control specialists – are able to use this capability to make informed decisions on patients' care quickly, freeing them to spend more time out on the wards, working with staff, patients and families to improve care.

Importantly, clinical staff are alerted immediately in the event of an infection, including clusters and outbreaks of infection. This ensures corrective actions are taken at the earliest opportunity, reducing the risk of the infection spreading to other patients or staff in the hospital or in a community setting. When the system is deployed nationwide in Wales in mid-2017, it will allow staff to track the care of patients with confirmed cases of an infection anywhere in Wales.

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Lord Carter estimates a 1% improvement in staff productivity will save the NHS £280 million a year. We have already seen in Wales that electronic infection surveillance improves workflow, communication and transparency of data, as well as broadening the scope of surveillance. Studies have found that automated systems reduce infection prevention staff time spent on surveillance activities by two-thirds or more, and the results provide much greater specificity and positive predictive value[v].

Response to an outbreak

Wales' project was in part a response to a large outbreak in 2013 of *Clostridium difficile* at Ysbyty Glan Clwyd Hospital, Denbighshire, where 30 patients died from the gastrointestinal infection. That outbreak, and high rates of bacteraemia caused by Meticillin -resistant *Staphylococcus aureus* (MRSA), led to a well-publicised report by microbiologist Professor Brian Duerden, M.D., of Cardiff University, highlighting the need for new governance arrangements, structures and systems for the prevention and control of HCAIs within Betsi Cadwaladr University Health Board[vi].

One of the key recommendations of that report is for development of an effective infection surveillance system from the ward level through to senior hospital management. However, to be most effective, surveillance systems need to integrate all the way to the national level.

The clinical surveillance system has already helped enormously at Betsi Cadwaladr University Health Board, as we can identify clusters of infection in real-time, which helps reduce the number of cases of *C. difficile* and MRSA. The software automatically hunts for patterns and relationships, and flags these up to the staff using the system, which can classify and predict where an outbreak might occur.

The software is also used for monitoring other infections, for example *Pseudomonas aeruginosa* in augmented care units. There have been some high-profile deaths of infants from *P. aeruginosa* in Northern Ireland in recent years[vii]. Our new software allows us to look back at trends on our special care baby units, and note any pattern or increasing trend. *Pseudomonas* is a natural environmental organism; it lives in moist places and colonises water systems. Water in augmented care units is sampled on a regular basis, as required by national guidance in place across the UK, to detect the infection if it is present in the water system. In the event of clinical cases we are able to review the data from ICNet to see if there is any possible link between the patient and the water system.

A national infection portrait

The software will also provide a national surveillance hub hosted by Public Health Wales. It will support existing mandatory national surveillance schemes,

providing a comprehensive picture of the infection rates for MRSA and MSSA bacteraemia, *C. difficile* and surgical site infections (orthopaedic and Caesarean section) across Wales. This also presents the opportunity for the national surveillance team to increase the number and scope of national schemes to benefit patients. It will even be used to support Wales's participation in the European point prevalence survey of HCAIs in acute care hospitals. National monitoring using this system has proven successful in New Zealand for surgical site infections.

Having national targets for HCAIs is important, but to make that meaningful, you need a truly accurate picture of the baseline rates of infection. Prior to having the new system at Betsi Cadwaladr University Health Board we had no system to provide those rates consistently and accurately; we do now.

Of course, at a time when any new investment is subject to intense review and debate, adding information technology is not easy. The Welsh Government signaled its intention to facilitate an all Wales solution to electronic surveillance in 2011. The findings in the Duerden report helped emphasise the importance of such a system, as did the 1000 Lives Campaign in Wales, which placed the financial impact of a single infection in a critical care unit at £28,564 based on bed days and drug costs. A grant of £1.9 million from the Welsh Government 'Efficiency through Technology' Fund, created in 2015 as part of an investment in the Welsh NHS to accelerate the adoption of new technologies, and new ways of working has made the adoption of both local systems and national monitoring possible.

Supporting antimicrobial stewardship

By next year medication audits will be available on the electronic system, which will be extremely helpful in driving increased compliance with local prescribing guidelines as part of our overall national antimicrobial stewardship program. Overuse and/or inappropriate use of antibiotics is linked with the rise of multidrug-resistant organisms such as MRSA, vancomycin-resistant *enterococci* and gram-negative bacteraemia, as well as *C. difficile* infections.

At some point we may also be able to use data on electronic prescribing and antimicrobial utilisation to provide real-time clinical decision support to better guide antibiotic prescribing practices.

Electronic surveillance is just one of a wide range of interventions to tackle the problem of healthcare-

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associated infections. It is an essential tool, giving local teams the data at their fingertips, which generates conversations amongst clinicians that lead to changes in practices. Ultimately, though, it will be the combination of all our activities that will have a meaningful effect on reduced infection rates and safer patient care.

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