HIT 2020: A brief history of healthcare IT in NHS Grampian 2010-2020
December 2020

Introduction
From the 1960s, Information Technology made repeated, often tragicomically unsuccessful, attempts to leave the back office of healthcare and play a useful role on the front line. Despite, or perhaps because of, the need for ubiquitous, timely and accurate information, paper persisted in the health sector for years after it was retired from retail, banking and engineering. By the 1990s useable electronic record systems became common in the consulting rooms of GPs and boutique acute departmental IT systems began to appear. However, it’s only been in the last 10 years that coherent IT has appeared at the acute frontline in Grampian. And even more recently that health and social care have become integrated around the patient. This is a brief history of those last 10 years; covering developments in software, hardware, communications and knowledge management. We are striving towards excellence in health information management; enabling high quality, individualised, timely, health and social care to be integrated around the patient. We’ve come a long way since the 1960s but this is not a journey with a destination; there will always be new possibilities, people pushing forwards, others hanging back. Policy, culture, resources and competition between demands to share and protect information will all determine where we are when 2030 dawns.

Software
Where are we and where are we going?
Health and social information is essentially electronic of course but paper is still sometimes seen; the appearance of a physical letter or clinical note provokes smirks from the younger members of the team and anecdotes from the older ones. The GP, hospital doctor, community physiotherapist, physician assistant, patient and social worker may use different records software but you wouldn’t know it. They can see most of the relevant information entered by the others, and can access it wherever and whenever they need to.
This approach is not without its problems though and discussions are starting about procuring a national CAPS (Community, Acute, Primary & Social care system).

As more information can be collected from multiple sources – human and machine, the patient record contains far more data than even five years ago and this will only grow. We used to think that making sense of individualised genomics had to be the ultimate health IT

---
1 Actually written March 2013 by Steve Baguley, Clinical Director of eHealth, NHS Grampian. Thanks to those who offered suggestions and comments.
2 Greyed sections indicate less certain developments.
challenge. However, now we are faced with demands for integrating individualised proteomics into the record.

How we got here
Until 2010 there was a stark contrast between primary care and acute/community care. The former having electronic records, the latter using paper; where only one person could read a record at a time, assuming the notes could be found.

In 2009 the Scottish Government procured a new Patient Management System and TrakCare was the product that was chosen. Initially Trak was just used for scheduling and to hold demographic data. However, in 2012 this began to change. A more complete record began to develop on the ‘chassis’ of Trak starting with the processing of referrals and moving on to requesting investigations (labs, radiology, cardiology, neurophysiology, endoscopy etc) and making clinical notes. The old paper records were scanned as they were needed and accessed via Trak. Those scanned notes are rarely viewed these days. The space that was no longer needed for notes was used for other things; hospitals are becoming more compact.

Initially people used Trak itself to view information, but from 2013 add-ons began to be developed for specific tasks such as phlebotomy, vital signs observations, clinical notes and duty assignment. This trend has continued so that what we see now looks nothing like the Trak of 2012. Electronic prescribing and medicines administration came to acute in late 2014 but took over a year to fully implement.

The standalone IT systems used by some acute and community departments persisted for several years but, after most services adopted the Trak-linked approach, that slightly isolated way of working began to seem a little risky.

All this software was only of any use with hardware of course, as described below.

Although it seems a long time ago now we shouldn’t forget how awkward life could be in that hybrid electronic-paper world where expectation fanned by consumer technology met an actuality that seemed relatively unsophisticated. This was particularly the case early on when IT was simply shoehorned into a physical and cultural environment geared to moving bits of paper about. It was only in 2014-15 that the opportunity, indeed necessity, for major process redesign was recognised.

Hospital staff had acquired an electronic window on primary care data back in 2004 with the launch of what was then called the Emergency Care Summary. As the name suggests, access was initially quite restricted but, from 2013 the Care Summary was available to anyone with legitimate interest in seeing it. More sophisticated IT security (live breach-detection in 2014 and improved identity management) coincided with a gradual cultural shift in the NHS and the public which recognised that it was generally better to share data than not. Ten years ago the ECS was seen as a great development but, in retrospect, the window it provided was just a chink in a wall compared to the real-time structured data that’s been accessible for
the last few years. The reverse approach allows the GP to get a realtime view of how an inpatient is getting on. These links have in effect created an integrated health record; speeding patient management, reducing the risk of harm and improving patient satisfaction.

Needless to say, community workers – nurses, AHPs, social and midwives all have just as comprehensive a view of the electronic record as their more sedentary colleagues in primary care and acute.

From 2008, some patients became able to access fragments of their electronic record. Further access was slow to materialise; partly because of privacy concerns and partly because there wasn’t a lot for patients to see. Gradually the situation changed; primary care portals allowed patients to book appointment and request repeat prescriptions. In acute, patient portals for specific conditions – eg chronic kidney disease, led the way; allowing patients to see results, correspondence and add their own observations such as blood pressure and symptom status.

When it became clear that patient portals weren’t just there to meet the demands of the vocal few but could actually improve healthcare, development accelerated. We now recognise that portals can improve health literacy, thus keeping people away from the health service, as well as being one of the best audit tools imaginable; knowing that the patient sees everything we’re doing helps maintain quality remarkably well.

The popularity of portals brought its own problem though with patients having to log in separately to, say, their HIV, renal and primary care records. The launch of My Health 24 in 2015 helped bring it all together with patients seeing a single front end regardless of which record systems lay behind it. Cultural change has been a little slower but most people now recognise that the patient’s record is just that – a patient-owned repository of information which is accessed by others as the need arises.

Hardware

Where are we and where are we going?

Computer hardware is an eclectic zoo with people using the most appropriate device for the job. Most clinicians have a tablet for mobile work which is then wirelessly docked when working at a desk, eg in outpatients. The dock allows use of a keyboard and large monitor. This is the same whether they work in acute, primary or community care.

Administrative staff generally use desktop computers, with the computer integrated into the monitor. People typically type when in desktop mode but all monitors now support touch. Speech recognition is quite widely used and digital pens have a persisting niche. The combination of eye tracking with speech recognition has been trialled and has potential to speed up work but probably only for those who aren’t self-conscious or who have the luxury of working on their own.
On the wards, tapping and swiping are the main ways of interacting with the tablet, with speech used by some people for longer notes.

Fixed equipment is owned by NHSG but the tablets and laptops are a mixture of staff-owned and NHS-owned.

Phones are a secondary item of computer hardware and have many functions including dictating notes, accessing information to support care, managing tasks and of course being the main way to be contacted.

For community staff and other people doing home visits, fast live links to the patient record using 4G are the norm but people can temporarily download records to their device if needed. There are persistent grumbles about connection black spots however and it’s hoped that 5G – due at the end next year, will improve this.

The distinction between health IT and medical devices is quite blurred with almost all vital signs monitors in acute now connected to the network and feeding results to the record. Some of these monitors resemble thick sticking plasters attached to the patient for the duration of their admission or when back in the community. We’re also starting to get monitors that sit above the bed or in the home and use radar to measure BP, pulse, respiratory and heart rate without touching the patient. Both developments have led to reductions in Healthcare Associated Infections, more timely monitoring of deteriorating patients and freed up staff for other tasks.

Patients can connect their mobile devices to the WiFi. On the wards they can use their tablet or the bedside terminal to follow the progress of their care via the portal as well as completing questionnaires about their symptoms and giving feedback on staff and the hospital environment. Patients keep in touch with the outside world with their phone or tablet – even more important now that almost every bed is in a single room and healthcare requires less human contact.

How we got here
Ten years ago most computers in the NHS were desktop PCs. This was OK because GPs were mostly desk-based and other, more mobile, clinicians didn’t have much clinical software. The rollout of WiFi from 2009 enabled the use of laptops in some clinical areas, for completing electronic discharge letters for example, but this was initially sporadic and the WiFi network was like a motorway with negligible traffic.

A major spur to increasing hardware in acute was the rollout of electronic test requests (Order Comms) in TrakCare from 2012-13. This necessitated the use of hardware on ward rounds and by phlebotomists. Advances in battery life and monitors meant that mobile workstations were a good solution during this phase. As the acute EPR developed however a
further hardware gap was exposed as people needed to take notes to the bedside, to multidisciplinary meetings and everywhere else the paper notes would have gone. There was great enthusiasm to use iPads and other tablets but, when this became possible in 2012/13, there was frustration that most clinical software didn’t work as well as on a Windows PC; although software availability gradually increased. The proliferation of mobile devices began to overwhelm the WiFi network in 2014 necessitating an upgrade to a new standard – the one we are now, in turn, upgrading from.

Community staff in Grampian began to use IT in a significant way about eight years ago. Initially using digital pens to share care plans via SCI store. Then came tablets with software that supported a download of the day’s worklist and apps for simple note taking. However it was the arrival of near omnipresent 4G in 2014 that really allowed IT in community care to take off.

This was a difficult time as we balanced the slowly developing acute and community EPRs with the requirement for major investment in hardware at a time of exceptionally limited financial resources. Inevitably developments in hardware, software and communications were out of step and we must accept that this imbalance is normal and will continue.

**Communications**

*Where are we and where are we going?*

The main communication tool is the phone\(^3\). They are used for ward staff to call a doctor in the way we once used bleeps and for hospital, community and primary care clinicians to discuss patient care. Written communication is still used of course but is almost entirely electronic, and speech is preferred due to its immediacy.

Tape-based dictating systems were gradually withdrawn from 2009 in favour of digital dictation. There was board-wide adoption of digital dictation from early 2014. This led to faster letter production and communication with GPs as well as ending the information governance horror of lost tapes.

When a patient needs help, their call is sent from their ‘buzzer’ via WiFi to the phones of staff covering their room. The first nurse to respond can then speak to the patient or visit the room. Thus nurses are not tied to the staff base and can be free to attend to patients’ needs more rapidly; calling for back-up via their phone if needed.

---

\(^3\) Or ‘mobile phone’ as they used to be called.
Foresterhill and Dr Gray’s have their own 4G masts. This ensures network availability for non-WiFi calls and reduces the strength of the signal needed to be transmitted by the phones; mitigating the risk of interference with medical equipment.

Videoconferencing is widely used; typically from desktop or mobile computers. The main use is for meetings but telehealth often involves a videolink of course. A typical outpatient clinic now includes patients who are physically present and those who are at home or their local health centre; linking in with the specialist by phone or video.

The paging infrastructure is still in place but only features as part of the disaster planning as it uses different technology from 4G and WiFi.

Because verbal and video communication is used more than writing we don’t have the same record of the interaction as when we had paper. The occasional patient complaint has made us think about how to address this and we have started scoping what sort of an audio-visual archive would be needed to capture these exchanges – both how many petabytes of storage it would need and how it would be accessed.

How we got here

By 2011 the WiFi network in Grampian was the most extensive of any Scottish health board. From 2012 WiFi handsets started to be used by porters and some clinicians; including the hospital at night team. From 2013 WiFi phone apps on smartphones were supported; allowing calls to be forwarded to them from their desk phones; for those who still had a desk.

Before 2013 mobile phones were prohibited in clinical areas due to concerns about interference with electromedical equipment. However developments in phones and medical equipment reduced this risk. There was also an appreciation that the advantages of phones for communication outweighed any risks of interference with equipment. Thus, from 2013, clinicians were permitted to use phones in clinical areas. This drove the adoption of apps for decision support, clinical assessment and note dictation as well as simply using the phone for calling.

The NHS was one of the last organisations to insist on paper correspondence with the public due to a belief that electronic methods risked information loss. It’s only been for the last five years that this has changed – the default approach now is for patients to send or receive messages using the portal; in the way pioneered by banks in the 1990s. The paper option remains for the few who don’t have internet access.
Knowledge

Where are we and where are we going?

Regardless of role and location people can get access to the right information at the right time to assist with patient management. A nurse or AHP in the community looks at clinical guidance and a service directory (NHS, local authority and third sector) on their tablet. A GP has most of the guidance they need for diagnosing and prescribing imbedded in their clinical software and can easily find a number to call a specialist for advice when needed. A doctor on a ward pulls up the BNF and the local pathway on cardiogenic shock on their phone. When they need to audit their management of asthma exacerbations the information is there immediately for them to see.

A unit operations manager reviews a live dashboard on their tablet showing patient feedback, Healthcare Associated Infections and the bed state. Patient safety and care quality is constantly presented to the senior hospital management and displayed on the wards and GP surgery waiting rooms for the public to see.

Patient experience counts for a lot – it’s the best single measure of quality, so we elicit it in a number of ways. Patients are invited to give realtime feedback – in GP waiting rooms, outpatient clinics, on the wards, using their phones. Every inpatient is automatically contacted by their chosen method post discharge inviting them to provide feedback via the portal. The portal is also the main place for patients to improve their knowledge and self-management of their health and wellbeing. When logging in to look for test results or to order more medication the educational environment is tailored to them. “You might also be interested in...”. Gamification has made self-management more attractive.

Clinical software that advises on investigations and treatments can have a significant impact on patient care. Accordingly these applications are classed as medical devices and regulated by the Medicines and Healthcare products Regulatory Agency. Traceability systems allow realtime, automated tracking of inpatients, community staff and equipment.

Maths is used widely behind the scenes. For example taking data from the met office, national health surveillance systems and geographical information systems to model the likely demand on beds in the coming days. The acute anticipatory care team monitors an awareness platform of all patients in Grampian hospitals and intervenes early in cases of unexpected deterioration.

Community anticipatory care has a similar approach but includes data from primary care and local authority records to predict deterioration of existing illness and even the development of new ones.

The more we monitor and intervene in the lives of those who are not yet unwell the greater the benefits to the individual and society but the more uncomfortable libertarians get about the role of the government in people’s lives. This tension is good and will always exist.
How we got here

Electronic decision support became available in the mid 90s but it wasn’t until about 2003 that things became more sophisticated with prescribing support in primary care, the development of the Clinical Guidance Intranet (CGI) and nationally agreed guidelines available on the internet. Further developments included Scriptswitch to improve antibiotic stewardship in primary care and a revised version of the CGI that also covered acute care and helped GPs and specialists get in contact with each other more easily.

From 2013 decision support began to be imbedded in acute and community IT systems followed soon after by the acute electronic prescribing and medicines administration system.

There was some concern initially about automatically tracking the movements of inpatients using radio-tagged wristbands. Initially they were just used for the more vulnerable patients but it was soon realised that they allowed more efficient use of bed management on the wards and made patient identification easier; thus reducing ‘wrong patient’ errors in transfusion and surgery. The system is now used for all inpatients and in selected community patients – for example allowing people with dementia to live independently for longer.

Starting in 2006 the risks of patients deteriorating and requiring admission began to be modelled using historical data. By 2010 this had advanced to give a near real-time view of the people most in need of anticipatory care; when the data was available. The incorporation of acute and social care data into the models and the gradual increase in home monitoring mid-decade increased the amount of data accessible by such systems and made them more widely used. This of course substantially increased the demand on primary, community and social care to intervene early but was probably the single best intervention we have made to reduce hospitals admissions.

Conclusion

In the decade since 2010, IT has enabled great improvement in healthcare processes. We have moved on from silos of information and care that could be dis-integrated and inefficient. Clinicians now have access to all relevant information about the person they’re seeing and that patient receives safer and more efficient care as a consequence.

The smaller hospitals and health centres which are now being planned – because IT has meant they need less storage space and fewer staff, have freed up resource for primary and community care. This results in better support for patients in their homes and further reduces the demand on acute hospitals – meaning only the sickest patients and those needing major surgery are admitted.

These improvements didn’t come easily however; they needed significant up-front investment and required staff to engage with a lot of change. But we are all now seeing the benefits of those efforts.