

# Could automation improve efficiency and help pharmacies with cost saving?

Spending cuts and cost-saving are frequently mentioned in the media, and the NHS is not immune to them. Could automation in pharmacies help increase efficiency and cut costs? Ailsa Colquhoun investigates



Media coverage of the robotic installation at the Forth Valley Royal Hospital in Stirlingshire makes clear the media's expectation for the NHS in this post-spending review era of financial austerity.

Headlines such as "Hospital robots cut hospital pharmacy bill" appeal to an increasing sense of national thrift, sharpened recently by the announcement of cuts in public spending. They also lend timely weight to the argument for pharmacy automation, said Ron Pate, secondary care pharmaceutical adviser at the department of medicines management at Keele University. He said: "In this economic downturn, the spotlight is on systems that do more, do it better and do it with less."

Forth Valley Royal Hospital has risen to the attention of the national media on the back of the £700,000 worth of hospital drugs bill savings achieved by spending between £500,000 and £600,000 on a dispensing robot and a bespoke eWard system, as well as the army of subterranean robot porters that

transport everything from meals to clinical waste around the new site.

The robot, an ARX robotic system dispensing system installed for just under £400,000, features automatic loading and labelling — the latter of which is a first for Scotland.

This supports the use of the eWard system, a paperless ward system developed and refined by the NHS Forth Valley pharmacy team using methodology from the US-based Institute of Health Improvement. It is now available to trusts as a ready-made package from Glasgow-based company The Solution Works.

The hospital uses Ascribe pharmacy software and includes the two-way interface with the ARX robot that is on site, and the additional labelling functionality. The Ascribe system "asks" the robot for an item. If it is in stock, it is accurately dispensed by the robot and labelled. If it is not in stock, pharmacy staff will receive a message so that they know they will have to look elsewhere.

## eWard system

The eWard system holds patient demographics, clinical diagnoses and treatment plan information, and allows the recording of medicines reconciliation on admission. For the pharmacy, this has enabled 80–90 per cent of patients coming into acute care to have their medication details electronically recorded and medicines reconciliation completed within 24 hours, seven days a week. This compares well with the previous figure of 10 per cent, five days a week, and it has contributed to reductions in hospital death rates, says Jann Davison, lead clinical pharmacist at Forth Valley.

For staff, including technicians, the main benefit of dispensary and ward automation has been to increase the amount of ward contact time, and technicians now work alongside pharmacists to complete medicines reconciliation on admission. According to Mrs Davison, this has improved patient care to levels that, without automation, would have needed double the amount of staff to deliver.

“For staff, the main benefit of automation has been to increase the amount of ward contact time”

In stock control terms, the eWard system has freed staff to address the efficiency of ward-based pharmacy top up and the management of ward drug stocks. By ensuring patients' own drugs are used during their stay and on discharge, staff have decreased the amount of medicines dispensed by more than 20 per cent. Such are the savings made that the hospital has introduced a “cost-neutral” weekend clinical pharmacy service (the costs of introducing the service were offset by the savings made by automation). There has also been a 50 per cent reduction in the time taken to discharge a patient, a process that is helped by eWard's facility to email patient discharge letters within six hours. The hope is to pilot the sharing of this information with local community pharmacies, with a view to roll-out during spring and summer 2011. Mrs Davison hopes that, ultimately, this will become a two-way process, with community pharmacies feeding patient information into the admissions process.

Since its official launch in August 2010, there have been many visitors to Forth Valley, including Scotland's chief pharmaceutical officer Bill Scott, who has described it as “technically the best in Scotland”. Mrs Davison is quick to commend the automation. She says: “We have created an infrastructure for patients that improves safety and quality. People tell me they can't afford it, but I tell them they really can. The investment will more than pay for itself.”

#### Strategic drivers

The NHS has no shortage of national drivers that seek to achieve the goal of improved cost efficiencies. In Scotland, there is the NHS Scotland Quality Strategy, and, in England, the Quality, Innovation, Productivity and Prevention (QIPP) programme, and the Commissioning for Quality and Innovation (CQUIN) framework. Specifically targeting efficiencies through automation are the various national programmes for NHS IT.

Mr Pate thinks that these national strategies present significant opportunities for NHS pharmacy department heads to make the case for investment in automation. Speaking at a pharmacy robotics conference in September, Mr Pate told participants that automated dispensing systems are “a QIPP and CQUIN opportunity”. He said QIPP is all about re-engineering the care pathway to improve value. It is his view that robotics fits into all aspects of QIPP (see Panel).

Looking at the CQUIN framework, Mr Pate points out that the current 1.5 per cent “reward” (repayment of contract income) for successfully delivering a CQUIN scheme could be worth about £2m to the average trust. Describing discharge medicine waiting times in some trusts as horrendous and an embarrassment, he says that trusts should seek out CQUIN funding for services that could improve this measure. “It is highly likely that CQUIN budget will rise above its current contract value level,” he forecasts, adding that speculative figures of 10 per cent of contract value have been floated. “Trusts should go for CQUIN funding where they can. The cash is there to be had,” he said.

#### Lean towards automation

Another current national driver of trust investment in automation is Lean (see Panel), says Heather Fowler, the project manager contracted to deliver four workstreams involving automation at University of North Staffordshire NHS Trust. She says: “Although many of us have tried to apply Lean thinking in the past, it now has a name-tag, and that is driving its use.”

In the project at North Staffordshire, Miss Fowler was charged with delivering the trust's vision for electronic medicines management. This includes electronic prescribing, automated ward storage and electronic discharge. The vision was achieved against what Miss Fowler describes as a “challenging cost improvement plan”.

Lean principles aim to ensure that attention is focused on understanding what is important (the value) and eliminating everything that is waste (the non-value). By applying lean strategies, organisations are able to identify their key values and non-

## HOW ROBOTICS FITS INTO QIPP

Ron Pate, secondary care pharmaceutical adviser at the department of medicines management at Keele University, describes how, in his view, robotics fits into all aspects of the NHS Quality, Innovation, Productivity and Prevention programme:

- **Quality** Reduced patient waiting times for outpatients and discharge patients; timely ward stock deliveries; and redeployment of staff to enhance near-patient services
- **Innovation** New technology and improved medicines security at ward level
- **Productivity** Reduced dispensing time; space savings and ergonomic benefits; supported skill mix review/staff redeployment; and reduced stock holding
- **Prevention** Reduced dispensing errors; reduced “lost” prescription income out of hours; reduced staff absenteeism through sickness or lack of engagement with routine tasks

## LEAN

Lean is an improvement approach to improve flow and eliminate waste that was developed by Toyota. Lean is basically about getting the right things to the right place, at the right time, in the right quantities, while minimising waste and being flexible and open to change.

Lean brings into many industries, including healthcare, new concepts, tools and methods that have been effectively used to improve process flow. Tools that address workplace organisation, standardisation, visual control and elimination of non-value added steps are applied to improve flow, eliminate waste and exceed customer expectations.

(Source: NHS Institute for Innovation and Improvement)

values, and make efficiency improvements that maximise service delivery without slash-and-burn budget cuts.

At North Staffordshire, Lean principles were applied to four key processes: goods receipt, filling the robot, ward box filling and dispensing processes. Lean thinking resulted in the replacement of the computer system, the integration of store and a separate dispensary, and the installation of a RoboPharma automated dispensing system interfaced with an Ascribe pharmacy computer system. A new system for discharge dispensing was also established.

The result, says Miss Fowler, is that stock-holding values have been reduced and there have been improvements in discharge medicine waiting times. Staffing costs (ie, overtime) have also been reduced and the automation has been used to inform the future workforce plan.

However, the process has also flagged up a number of important lessons learnt. She says that trusts considering significant automation need to ensure they:

- Understand what they are buying, how it works and how it will fit in with existing department processes and workflows
- Allocate sufficient staff resources to the project
- Actively seek staff engagement, particularly during interface development and future developments
- Receive in-depth supplier training

Beryl Langfield is the executive lead pharmacist for computers, projects and business services at Imperial College Healthcare NHS Trust. She believes that a successful installation must also be accompanied by adequate support from the IT department. She says: “Once you have drugs locked in e-cupboards, you need reliable IT support to ensure that the IT doesn't just fall over. She also urges trusts to take the long-term view to implementing new pharmacy technologies. She says: “The

bottom line is if you don't use IT, you'll soon find yourself out of sync, particularly as patient needs become more complex."

### Getting the culture of change

The potential for staff cost savings is a convincing element in the business case for automation and no more so than currently because trusts recognise that they have to make investment now to provide patient safety over the next 10 to 15 years on what will be a limited budget, says Chris Wood, healthcare business manager at Panasonic. Panasonic recently supplied the Heart of England NHS Foundation Trust with CF-H1 Mobile Clinical Assistant e-prescribing tablets. But what does this do for the morale of staff, who have to implement and work with the technology? If staff are not on board with the idea of change, the trust is unlikely to see proper returns on its investment, Mr Wood suggests. "Staff engagement is critical," he says.

Looking retrospectively at the North Staffordshire project, Miss Fowler says that key to the success of her project was engaging the help and leadership skills of the dispensary manager and senior technicians. "Without their help, the project would have been dead in the water," she says. She also believes it was crucial to give staff a voice in the process and in highlighting the changes they wanted to see made. The end result is that they, as a team, have produced an environment that staff want to work in, and morale has improved.

Likewise, looking back at the Forth Valley Royal Hospital changes, Mrs Davison



highlights the importance of achieving what she calls the "five Cs of change":

- **Change** Embed in employees a culture of continuous improvement
- **Communication** Ensure there is communication at all stages .
- **Challenges** Overcome staff resistance and meet staff expectations
- **Cohesion** Bring together improvement methodology

- **Capacity** Create resource and service capacity

Practically, this may involve giving staff the resources (training and authority) to inform the implementation process and help engage their colleagues. It may also involve lead staff members in managing expectations and in maintaining engagement levels over what can be a long implementation period, she says.

### Bringing staff on board

Successfully addressing staffing issues has also been instrumental in pharmacy automation initiatives in three other trusts.

#### Imperial College

Imperial College Healthcare NHS Trust recently installed an automated compounding unit for hazardous sterile intravenous preparations. Ann Jacklin, chief of service, pharmacy and therapies, says that the initial reaction of staff to the technology "was as it is always with any piece of automation: they were very suspicious about the threat of redundancies". Thanks to careful management of the implementation, staff are now on board with the idea of using the technology and can see its benefits. Professor Jacklin says: "In fact, they now realise that technology brings with it a whole host of new jobs, in particular, managing the technology, and they love it. My advice is engage staff as early as possible in the implementation project. Even if you feel you are dealing with risks rather than benefits, the sooner you engage staff in the process, the better the outcomes will be."

The IV compounding equipment installed by the trust is Health Robotics CytoCare, which the trust looked to install for a number of business-critical reasons: to relieve the workload pressure of increasing day and outpatient treatment regimens; save money

## BENEFITS OF INVESTMENT IN AUTOMATION

Suppliers say that the time has never been better to invest in automation. Gill Collins, director of robotic dispensing system manufacturer MACH4 Pharma Systems Limited, says that, since suppliers have maximised system efficiencies, the cost of automation has decreased. Technological advance has also improved features such as item security and audit, the management of stock rotation and batch recalls, and hourly input rates. These have increased by up to 40 per cent, she says.

Additionally, the key benefits of an investment in a dispensary robot are:

- **Time savings** Inputs and outputs multiple packs in one movement; decreased patient waiting times; and redeployed staff time
- **Space** Up to four times as efficient as traditional shelving and capable of holding more than 99 per cent of daily dispensing stock
- **Accuracy** Stock control accuracy and barcode stock identification check

ARX claims an 80 per cent share of the UK and Irish pharmacy automation market. Recently launched in its range is the Rowa Vmax automated dispensing system, with features including:

- Maximum dispensing rate of up to 2,400 packs per hour
- Loading rate of 1,200 packs per hour
- Multi-pack picking
- Integrated camera for servicing and error detection
- Touch screen LCD dashboard for ease of use
- Optical and audio pack confirmation to ensure the correct packs are input
- Integrated box shelf should an emergency order be needed

Other robotic dispensing systems include the RP30 High Density Dispenser and RoboCube standalone dispenser from RoboPharma and, from Swisslog, the PillPick, DrugNest and BoxPicker units.

through sharing vials; to improve staff health and safety; and to reduce the hospital's vulnerability to skilled staff shortages.

Health Robotics markets the equipment on the basis that, in cancer care, there are growing pressures to improve patient safety and decrease operator risk.

According to Gaspar G. DeViedma, Health Robotics executive vice-president, sales and marketing, there is a hard and soft financial case to be made for the investment in this kind of equipment. In hard terms, they reduce the waste of expensive drugs and vials and, in terms of labour costs, the equipment can be operated by non-specialist technicians, who are also protected from the physical hazards of manually compounding hazardous preparations. In soft terms, the equipment offers greater accuracy and patient safety benefits.

Health Robotics also markets the i.v.STATION for non-hazardous compounding, and the TPNstation for compounding sterile parenteral nutrition. Automated Compounding Devices (ACDs) are also available from Baxa.

#### Guy's and St Thomas'

Guy's and St Thomas' NHS Foundation Trust is currently in the middle of a mass £6.5m-plus automation initiative that has so far seen 105 Omnicell Smart Store automated ward medicines cabinets installed across 30 wards. Daniel Mandeman, the chief pharmacy technician automation system administrator, says that the installation represents one of the biggest changes in working practice for the trust in over 25 years.

Ward cabinets offer the benefits of instant, round-the-clock access to stock medicines contained in a clinical environment — the average transaction time with an automated ward cabinet is 15 seconds — which increases clinical contact time. Automated reordering also reduces the number of pharmacy top-up visits.

Safety features of the Omnicell Smart Store (Avantec) include barcode checks for high-risk medicines, better control of inventory stock, and reporting functionality, which provides an audit trail for stock and user work practices.

According to Mr Mandeman, the trust is on target to deliver a 20 per cent saving in stockholding, equating to £25,400. He also says that discharge medicines turnaround time has also improved. But, to achieve efficiencies, a degree of management is required, he says, not least to ensure that the drawers are located in the right place clinically (eg, proximity to sink and preparation area, and airflow) but also practically to ensure they offer nursing and pharmacy staff the best speed and efficiency gains.

Furthermore, pharmacy departments need to allocate resources to ensure that stock replenishment levels and delivery processes are optimised and that the reporting functionality delivers business-critical information.

Other near-patient automation options include the ServeRx range from JAC Medicines Management, Mediwell Medi 365 cabinets and the Pyxis MedStation range.

#### King's College

In an evaluation of an electronic Controlled Drugs cabinet and electronic CD record, King's College Hospital found that staff rated electronic CD cabinets better in terms of time taken to dispense and ease of use, but worse in terms of accessibility (eg, forgotten passwords). They concluded that moving to electronic storage and recording had the potential to save around 6.25 hours a week, compared with non-automated processing.

King's used an Omnicell CD cabinet, with features including modular cabinet-based storage; Keyless restricted access; automatic drug location guidance; and reporting functionality.

The trust is now looking to link the cabinet to another in the trust to test the suitability of automatic CD order creation. This aims to relieve pharmacy workload pressures.

#### Discharge dilemmas

At the 500-bed Milton Keynes Hospital NHS Trust, the average turnaround time for dispensed items has been halved. The pharmacy is no longer seen "as the department that is the source of delays to discharge", says the trust's chief pharmacist Niall Ferguson about the introduction of a new electronic discharge system that offers the pharmacy department easier access to discharge prescriptions, and which has the capability to email discharge letters to GPs. Through the inclusion of mandatory information fields, the system has also improved the quality of discharge information provided by the medical team.

Two pharmacists have been employed to input data into the system, whereby patient medication histories on admission are used as basis of the discharge prescription, which can be updated during the patient's stay. It is Mr Ferguson's view that the system, which was customised from an existing electronic discharge system at a cost of tens of thousands of pounds, is functioning as a useful "stop-gap" to improve discharge processes and avoid primary care trust penalties until fully integrated e-prescribing systems can be implemented within the trust.

The e-discharge system is supported by an ARX dispensing robot, installed to improve efficiencies by reducing stock-holding costs and boost income from prescription charges gained from accident and emergency patients. According to Mr Ferguson, the robot, which was purchased on a lease basis and installed for under £180,000, has already reduced the value of held stock in the pharmacy by between £150,000 and £200,000 and it has significantly reduced picking and dispensing errors. Furthermore, the installation has reduced the trust's vulnerability to vacancies and, following a skill mix review, it has enabled staff to be released to increase their clinical contact

time. As a result, the pharmacy is no longer seen as just a dispensing service but as a patient-focused service, he says.

In some environments, for example, paediatric wards, the ability to operate in the near-patient environment is critical, says Will Thornhill, principal paediatric pharmacist at Guy's Hospital, London. Patients may be using multiple unlicensed medicines and carers may need help and support in administering the medicines. To deliver near-patient care, the ward operates mobile pharmacy trolleys, supported by an Episys labelling system. This offers features including label preview, header-and-footer verification and batch recording devices.

For the pharmacy staff, Mr Thornhill says that benefits include the professional satisfaction of delivering quicker, more comprehensive one-to-one patient care and, due to decreased interruptions, accuracy has improved. The hospital is also able to claim CQUIN funding for providing a medicines information service.

#### Vending the rules!

Love them or loathe them, prescription vending machines are set to become a presence in pharmacies in both primary and secondary care, according to installation company PharmaTrust. PharmaTrust plans to have six MedCentre installations in secondary care sites by the end of the first quarter of 2011. The company then hopes to focus resources on building deployment in the community, according to managing director Peter Ellis.

The machines, which offer visual link access to a remote pharmacist, function as mini-dispensaries. Each MedCentre can accommodate over 2,000 medicines,

## SMART PACKAGING

According to research from the US, smart packaging is currently in development in a handful of high-profile, high-stake segments. These typically include cardiovascular and neurological drugs, drugs for treating metabolic diseases, and drugs with a significant risk associated with overdosing, such as opiates prescribed for pain management. It is said that the key challenge for smart pharmaceutical packaging is to deliver the four major markers of compliance with drug protocols:

- Prompts or reminders for patients who routinely or systematically forget to take their medicines
- Addresses gaps in therapeutic benefit associated with patient failure to get repeat medicines in a timely manner (automatic reordering)
- Encourages patients to adhere to medication schedules (caregiver or support network notification)
- Reinforces positive behaviour (periodic visual reporting)

including refrigerated items, injectibles and pharmacy medicines. In secondary care, the kiosks offer an alternative source of dispensary medicines, which reduces workload pressures and increases time available for counselling. For patients, they offer the opportunity for round-the-clock access to medicines. According to PharmaTrust research, 78 per cent of patients say they are likely to use a kiosk in the future and, on exit interviews, 97 per cent say they are satisfied with the service they had received.

As for implementation in the community, discussions with the Department of Health have begun, and NHS chiefs are said "not to be against the idea", according to Mr Ellis. As the debate to establish pharmacy supervision protocols begins, the task ahead is to "prove the benefits of access and safety, and that it provides a more cost-effective service," says Mr Ellis.

ARX is also marketing a similar prescription ATM-type system, although its version, VisaVia, is linked to an ARX dispensing robot.

At Sainsbury's supermarkets, prescription vending machines are also being trialled (*PJ*, 7/14 August 2010, p139), although the units are intended only to act as a prescription reception and collection point for patients not wanting to speak to a pharmacist, who is physically present in-store and checks the

suitability of the patient and the prescription for the machine-collection model.

According to Sainsbury's professional services manager David Gilder, the units should appeal to the 95 per cent of supermarket pharmacy customers who do not want to wait while their prescription is dispensed.

He says that, in the first eight weeks of operation, the two units at Sainsbury's stores in Haywards Heath and West Green in Sussex had attracted 730 users, who were typically aged over 50 years wanting their repeat prescriptions dispensed. After Christmas, the chain will be conducting more in-depth user research to assess the potential for wider roll-out and development of functionality, for example, adding a touch-screen advice point.

According to Mr Gilder, the trial will run until October 2011. He says: "Pharmacy is being looked at to provide additional services, and this frees the time to provide those services. Anything that benefits the patient and the pharmacy should be welcomed. The profession needs to move in line with technology and embrace it."

#### Opposition

Opponents of the technology describe vending machine technology as ridiculous. Norman Niven, chief executive of MDS supplier Protomed, says: "Vending machines

demean the role of pharmacy. It effectively puts us in a box that you can switch on and off."

Instead, he advocates that pharmacy should move towards co-operative technologies that support the pharmacy team to develop income streams that are uniquely provided by a pharmacy, for example, medicines management. He says: "e-prescribing is here and, with patient nomination, pharmacies can easily see their footfall reduce to nothing. Pharmacies need to consider other ways of securing sales, and making use of the window of opportunity, or else they will wake up one morning and find that their business has gone."

With this in mind, Protomed is using a £79,000 North West Regional Development Agency grant to develop a new concept in "intelligent" MDS: Biodose Telepak, which it hopes to have ready for the market by mid-2011. Telepak systems feature a chip with radio frequency identification capability, allowing the packaging to transmit data to patients, carers or GPs, possibly via text messaging. Metrics, such as heart rate, blood pressure and blood sugar levels, are used to correlate medication compliance with physiological outcomes.

Mr Niven believes that these patient compliance reports will become a new fee-for-service income stream for pharmacists with a speciality in medication management.



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