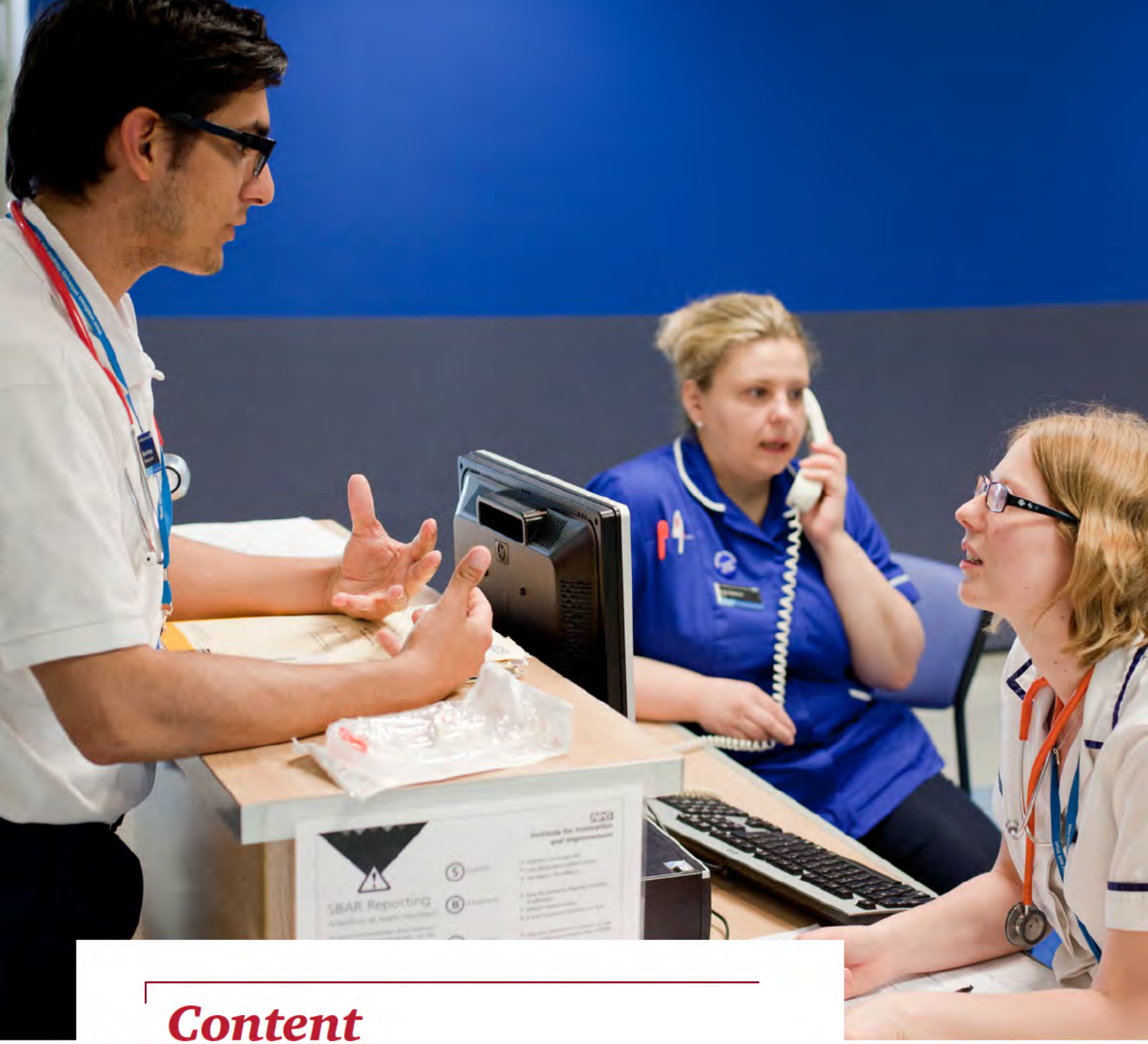
www.pwc.co.uk

Prescribing a paperless society

How blockchain can deliver electronic prescriptions

December 2017

pwc



Content

Introduction

Since the creation of healthcare systems paper prescriptions have been used to communicate prescribing details. To this day the majority of prescriptions are still prescribed and printed onto paper. In a digital age where most of our information is transferred and communicated without the use of paper there is an opportunity to do the same with prescriptions. Whilst there has been some progression in electronic prescribing, there are still many barriers to overcome to ensure the system performs to an appropriate standard. Recent cyber attacks on the NHS have shown the value of patient data to criminal forces.

Through blockchain there is an opportunity to create a secure system that will, if designed and implemented well, ensure patient safety, protect data and deliver efficiencies to the system.

Current problems in prescribing

In this section we illustrate some of the problematic scenarios facing the current prescribing system.

Dr Green has a consultation with his patient, James. Once he has decided on an appropriate treatment, the prescription details are printed along with a 2d barcode. This 2d barcode can be scanned at the pharmacy and the details automatically updated onto the pharmacy dispensing system.

Although this seems a simple process, there are issues along the prescription journey.

As a prescription, I can be:

Lost

James goes to collect his prescription and the receptionist, Kelly, is not able find it.

- She will have to reprint it and get it signed by the doctor.
- Kelly thought John had already collected the prescription:
  - Did she give the prescription to the wrong patient?
  - Has it got lost in other administration work?
  - Is it with the GP for review or signing?
  - Has James collected it already and is deceiving the doctor into getting another prescription?
  - Did the pharmacy collect the prescription on behalf of James?

Damaged

If a paper prescription can be damaged thus causing issues with the legibility of the details.

- A patient can tamper with the prescription details. In cases where the prescription is hand written, this is easy to do. If the prescription is printed, James would still be able to amend the prescription changing the prescribing details. This could be to increase quantities or the strength of a drug. James could also add medication known to be abused or misused by merely handwriting the required drug details.
- James' prescription could be damaged through paper tears or water damage.

Erroneous

If the 2d barcode does not print properly.

- In some cases the prescription details are not translated into a readable format on the computer whether due to faulty software or printers.
- Handwritten prescriptions are subject to 'notorious GP handwriting' which can be hard to read which can cause dispensing errors to occur. Both scenarios are a challenge for Emma, the pharmacist, as they pose as patient safety issues and could result in fatal consequences.

Given to the wrong patient

James has been given the wrong prescription. The patient name is correct but his address is wrong.

- Human error at reception level can cause serious problems, not only in terms of harm to the patient if the error is not discovered, but also in the release of confidential and sensitive data.

Time consuming

Dr Green needs to write, print and sign the prescription. James needs to transfer the prescription by hand to Emma. Emma needs to query the prescription details and dispense the prescription.

- The process can cause long waits for patients when in need of a treatment. Time delays allows illness progression and could be the difference between treatment at home or hospital.

Fraudulent

Pharmacists could claim more in repayment from the Government than they have spent.

Paper prescriptions are endorsed with codes and quantities so as to allow pharmacies to claim payment from the government for the medication and services that have been provided. Every month the prescriptions are gathered, processed and submitted to a government body.

- Emma has the potential to claim for more than what she actually dispensed. If a prescriber, makes a quantity error for example, 100 tablets are prescribed instead of 10, and Emma notices the error yet claims for 100 tablets regardless, she is committing fraud.
- James can deceive a prescriber by claiming the loss of the paper prescription. The prescriber involved can reprint the prescription and may not know another prescriber has dealt with the prescription request. Multiple prescriptions are issued and James has access to large quantities of medication. Emma should query if multiple prescriptions are prescribed by different people on the same day for the same item. If James were to collect a prescription from multiple pharmacies, Emma would not be able to detect that the prescription had already been dispensed.
- If presented with the prescriptions, there is the opportunity for Emma to dispense all or just one prescription and claim payment for all, regardless of what has actually been given to the patient.

An emergency

Dr Green needs a prescription dispensed urgently. He phones Emma to dispense the prescription and he will post the paper prescription to her.

- When a prescription is phoned or faxed over to the pharmacy, this is not a legal document and Emma must make an ethical decision to dispense the medication as an emergency or wait for the legal document to arrive. If Emma were to dispense the medication she must ensure that:
  - The prescriber is registered to prescribe.
  - The prescriber is not being impersonated by a criminal.
- Prescriptions can be lost in transit so Emma has to keep track of prescriptions owed to her from Dr Green.
- Dr Green might forget to write up the prescription and, hence, there is no audit trail in relation to the medication that Emma has dispensed.

A foreign prescription

Pierre has a French paper prescription from Dr Bleu. He needs the item dispensed by Emma.

UK pharmacies are allowed to dispense European economic area (EEA) prescriptions.

- It can be hard to determine if the prescriber is registered and legally allowed to prescribe.
- It is hard to see if the prescription has already been dispensed.

Outdated and opaque

How does Emma know if the prescription is the most up to date version? When dispensing a prescription for James, how does Emma know for certain that the medication prescribed will not interact with something James is already on or taking?

- Emma cannot tell:
  - If the doctor has updated the prescription or medication,
  - If the patient has stopped the medication,
  - If the patient is due for a medication review,
  - If the doctor has cancelled the prescription issued.
- Unless James is a regular patient with Emma, she can only rely on the information that James provides or try and speak to the doctor to obtain a recent history which could be extremely time consuming and unrealistic.

In summary, the current system leads to a number of clearly defined issues for clinicians, pharmacists and patients alike:

- Prescriptions can be delayed in development and also take time to collect.
- Prescriptions will be released in batches from surgeries, therefore huge volumes can appear for dispensing. This can also affect time management of the pharmacy, the security of the data held must be considered, as measures in place currently are not adequate to protect patient data.
- Poor visibility of prescription data and medication history can cause serious health implications for patients and also medication waste if a prescription is not needed.

Although this example is pharmacy based, the issues apply across the whole of the NHS to anyone who might issue and handle prescriptions. With patient safety as key, it is essential that prescribers do everything they can to maximise the information they have in order to make an informed decision on a patient and give them the best possible care.

The difference blockchain would make

A blockchain is a secure, decentralised ledger holding all transactions in a network. Using blockchain technology, participants in the network can confirm transactions without the need for a trusted third party intermediary.

We have identified six areas where significant improvements to the current electronic prescriptions system can be made through the use of blockchain technology:

The need for multiple parties to share data

- Prescriptions can be accessed by the appropriate authorised individuals.
- Authorised users know the prescription is the most up to date version and who the prescriber is.
- Data is transparent and visible to authorised parties.

Multiple parties able to update data

- Prescribers can add information to the system to ensure prescribing data is relevant and accurate.
- Dispensing errors are minimised.

Verification

- Prescriptions can be trusted.
- Prescribers registration status is verified.
- Prescribing details are accurate and precise thus avoiding dispensing errors.
- Fraudulent prescriptions are minimised.

Intermediaries

- Prescriptions can be directly transferred from prescriber to dispenser.
- Reduction in translation and data transfer errors.

Time

- Quick transfer of prescriptions in a secure environment.
- Improved patient safety and patient experience.
- Monthly prescription audits completed more efficiently.

Transaction efficiency

- Pharmacists able to query a prescription.
- Prescribing and dispensing data available to authorised individuals to ensure effective and accurate prescribing.
- Prescribers, dispensers and patient sable to interact effectively and efficiently.

The benefits of using blockchain in electronic prescribing are clear:

- Prescriptions could be transferred from GP to Pharmacy with ease.
- James could walk into his pharmacy and collect the prescription without having to visit the surgery. (Although this can already occur with pharmacy collection services, the pharmacy can only collect prescriptions at specific time slots. By implementing a blockchain system, the pharmacist could access the prescription at any time of day after the prescription has been issued by the doctor).
- There would be no need for the prescription to be physically signed as when the prescriber has written the prescription, an electronic signature could be generated or a biometric measure could be used to confirm and verify the prescriber. Currently smart cards are being used in some platforms that identify the user and hence an electronic signature is created.
- Pharmacists or dispensers (those authorised to access prescriptions) could use thumbprint scanning to accept the blockchain and 'unlock' the prescription preventing unauthorised access.
- The patient can dictate the scheduling of his prescription thereby improving the convenience of the prescription process for him and also allowing for better time management within the pharmacy and the surgery reception.
- The pharmacist can plan their day more effectively meaning better quality of care for patients and greater concentration on dispensing checks, to reduce error rates.

As a prescription secured by blockchain, I become:

Instant

- As soon as Dr Green types the prescription, Emma has instant access to it.
- Prescriptions from emergency prescriber requests or EEA countries can be accessed without delay.
- In emergency situations, a valid prescription can be issued and received with limited inconvenience to all parties involved.

Traceable

- Emma can see when prescriptions were prescribed or dispensed and by whom.
- The time, date and pharmacist involved can all be traced, important in identifying those responsible for errors and hence a virtual dispensing log can be created.
- Emma can ensure that the interaction and communication between herself and the prescriber has been recorded, with a time and date stamp. This is important if any harm comes to a patient from a medication. Emma can show her communication trail, secured through blockchain. The same applies to the prescriber. The audit trail offers a 'safety net' for health professionals when providing evidence to support their actions.

Visible

- Emma should be able to access the prescription history and hence make better informed decisions when counselling patients, prescribing or selling a product. Through a Blockchain electronic prescribing system, all prescribers involved with one patient can see the prescribing history of the individual.
- In terms of out of hours services, all parties are able to see the visible trail of interaction between out of hours doctors and pharmacists. GPs can see exactly what has been prescribed in real time, without the delay for the service to update. All of this improves the quality of patient care, reduces error rates and reduces potential fraud.

Accurate

- Typographical errors and miscommunication are less likely to occur as the information is clear and easy to read. If there are any errors present, Emma can refuse the prescription and add comments either to query or rectify any mistakes. This would allow the doctor to receive an automatic message and thus resolve queries and errors at a faster rate.
- Prescriptions from EEA countries can be verified with more accuracy.

Secure

- Prescriptions are only accessed by authorised individuals, and are linked to each patient directly through a unique ID method. This reduces the risk of patients receiving the wrong prescription.
- Prescriptions will be not be able to be tampered with in transit from prescriber to dispenser. A patient will not be able to commit fraud through amending the prescription, and Emma can be assured the prescription is genuine.
- Prescriptions can no longer be water damaged or unreadable due to 'wear and tear'.

Simple

- The process becomes streamlined. Prescription data is received by Emma in a faster and more secure method. Patients can organise prescriptions at their own convenience and Emma or Dr Green can manage their time more effectively.
- Monthly submissions of prescriptions to government departments will be easier as there can be direct transfer of prescription data between parties. Prescriptions can also be categorised automatically therefore the process becomes more efficient and time can be spent on improving patient care etc.
- Prescriptions that are chargeable are also able to be dispensed and recorded in a ledger system. The pharmacy must also maintain a private register, recording any medication not prescribed on an NHS prescription and also any fees that have been incurred. This can all be automated on blockchain through the creation of a ledger system.

Cost effective

- Emma and Dr Green are also able to monitor prescription ordering and collection. Through this, better control of drug misuse can occur and also reduced drug wastage. Dr Green can monitor if patients are taking the correct dose of medication and address any compliance issues.
- Emma can monitor her stock levels with more accuracy and also reduce the rate of prescription items that are owed to the patient, through better planning and ordering.

These improvements can also be applied to the hospital setting. Prescribers could prescribe from a mobile device from a patient's home, or from any bed in a ward, and transmit the prescription direct to the pharmacy. In emergency community cases patients can receive faster treatment which could be the difference between treatment at home and admission to hospital. Admission rates are lowered, infection control improves and hospital funds can be used to target other areas within healthcare.

A blockchain secured prescription could also bring clarity around where drugs are used: either prescribed fo ruse by the patient at home or for use as a patient whilst in hospital. This clarity will support improved controls around the VAT treatment for pharmaceuticals.

In addition, hospital admissions and records can be improved. The current system can see what GPs have prescribed but the hospital pharmacist will normally confirm with the community pharmacy what has actually been dispensed, especially if the patient is confused or receives regular repeat medication, or a weekly medication pack. A blockchain system would show visibility in what has actually been dispensed and allow medical staff to create a more accurate and efficient workflow meaning hospital staff can give more time to other issues or tasks.

Conclusion

The future impact of electronic prescribing, through the use of blockchain, will:

For further information contact

Steve Davies
Partner, Global Blockchain Lead
T: +44 (0)7590 352408
E: steve.t.davies@pwc.com

Seamus Cushley
Director, Digital and Emerging Technology
T: +44 (0)7843 332944
E: seamus.cushley@pwc.com

Christopher Clements
Delivery Lead, Digital and Emerging Technology
T: +44 (0)7843 332946
E: christopher.clements@pwc.com

Ailis Mone
User/Researcher Tester
T: +44 (0)7718 978766
E: ailis.mone@pwc.com

Global Blockchain Impact Centre
uk_blockchain@pwc.com

Health Industries at PwC

Healthcare matters to us and it matters to our clients. We all want better healthcare, sooner and the potential is there to make it happen. New technology, new breakthroughs, new ideas. But while there are opportunities, there are challenges too: constrained budgets, an ageing population and an increase in chronic conditions. At PwC we're working with clients to steer a course to success in this new health economy so we help improve healthcare for all.

We are working with the NHS, nationally an locally, as well as the private sector and the Pharmaceutical and Life Sciences sector to deliver real, workable solutions to today's challenges. We are delivering transformation and integration projects with patient outcomes at their heart. And we are supporting organisations through testing financial times often developing bespoke operational and digital systems. We provide strategic support to organisations across healthcare and pride ourselves on convening different parts of the system to solve problems.

We also bring insight and expertise to healthcare as well as engaging in the public policy debate. For more information read our Health Matters blog: *pwc.blogs.com/health_matters/*

171204-100558-JG-OS