Recently, the baseline specification for the Connecting for Health (CfH) electronic prescribing programme was published, describing the functionality required of electronic medicines management software that will be provided for the programme. This software will come from CfH software suppliers via local service providers (LSPs). The specification was formulated following a series of engagement meetings with clinical professionals about a year ago and taking into account comments made by interested parties on a draft specification published in September 2006. This specification is a clarification of the relevant section of the (then) “National programme for information technology output based specification” published in 2003.

**Scope of the specification**

The baseline specification represents the minimum specification for CfH electronic medicines management software. It seeks to address longer-term requirements as well as immediate priorities, but the functionality described will be implemented in phases. How it will be phased, however, is not clear as yet. Functional requirements have been given a priority rating on a three-point scale (1 being the most important and 3 the least). These ratings reflect the priority assigned by attendees at the engagement meetings.

The baseline specification covers electronic prescribing in secondary care — specifically inpatient, outpatient, day-case, and accident and emergency patient episodes. It does not cover prescribing in primary care although, in various functional areas, there is a need to link with primary care and pharmacy systems in the community. Also outwith the scope of this document are the implementation and roll-out, the technical requirements and the testing of the system. However, the implementation and technical specification of the system will have important implications for its performance and scalability, and therefore its fitness for purpose in the functional areas.

The first part of the document describes functional requirements in the following general areas:

- Inpatient prescribing
- Inpatient medicine administration
- Discharge prescribing
- Outpatient prescribing
- Medicines management
- Drug reference file

The remainder of the document focuses on additional specific requirements for clinical specialties. They are subdivided as follows:

- Anaesthetics
- Accident and emergency
- Maxillofacial, dental, ophthalmology and ear, nose and throat
- Obstetrics and gynaecology
- Renal and hepatic medicine
- Mental health
- Diabetes and general medicine
- Surgery and orthopaedics
- Clinical pharmacy
- Gastrointestinal medicine, respiratory medicine and palliative care
- Neurology, radiology, infectious diseases and genito-urinary medicine
- Care of the elderly, dermatology and rheumatology
- Oncology and haematology
- Paediatrics

**Principles of electronic prescribing**

The baseline specification defines electronic prescribing in the following way: “The utilisation of electronic systems to facilitate and enhance the communication of a prescription or medicine order, aiding the choice, administration and supply of a medicine through knowledge and decision support, and providing a robust audit trail for the entire medicines use process.”

This is a good working definition for an EP system because it takes into account the capacity of an EP system to add value to the patient’s prescribing history and care plan through knowledge and decision support, as well as storage and communication of medicine orders.

The document outlines a number of general principles and requirements for an EP system.
An EP system should:

- Support complex prescribing (reducing doses, variable rate infusions, etc)
- Support paperless medicines administration
- Support near-patient medicines management
- Use an approved third-party database with a dmn+d data structure to support data and decision-support requirements
- Provide decision-support functions across different clinical specialties
- Store a fully auditable record of all prescribing and medicines management decisions made on the system
- Use appropriate hand-held and wireless technology (personal digital assistants [PDAs], palm or tablet personal computers) to facilitate the provision of the functionality in the clinical environment
- Interface with devices used in different clinical settings (eg, infusion pumps, endoscopy reporting devices, radiotherapy machines) to enable seamless flow of real-time clinical data into the EP system

Developing an EP system with these general principles in mind will ensure that the system is comprehensive, flexible and powerful enough to be used in any clinical specialty or setting. Furthermore, these principles will ensure that the system supports hospital care processes as closely as possible and facilitates the involvement of clinical professionals in more advanced patient care initiatives. However, some of these issues are unavoidably linked to hardware capability and performance issues — for example, use of wireless technology and hand-held devices for ward-based activities, and the interfaces required for medical equipment in different specialties (anaesthetics, radiotherapy, etc). As a general principle, the development of fit-for-purpose clinical systems — in this case, a medicines management system — cannot be considered in isolation from the technical requirements for the platforms upon which it will be mounted. It should be noted that those software providers with the clearest track-record in producing pharmacy and medicines management software are specialist organisations that combine IT capability and pharmacy experience and expertise — companies such as Ascribe and JAC Systems.

Implications for pharmacists

Detailed review of the document indicates that the implementation of the functionality could have a number of significant implications for clinical pharmacists in UK hospitals.

Support for clinical specialties

The document outlines detailed functionality required to support specific clinical activities, for example, in mental health, the requirements for patient treatment under sections 2 and 3 of the Mental Health Act. Although the CHI consultation meetings have highlighted the need for these functions, clinical specialists will need to be involved in the detailed design of these areas of functionality, to ensure that the EP system is fit for purpose. Since the professionals who are most conversant with current practice are, by definition, the relevant practitioners in the NHS, there will need to be some way in which they can contribute to the software design at the design phase. Clinical pharmacists in various specialties are the obvious points of contact for detailed software-design issues and are natural facilitators for the views of other health professionals to be taken into account.

Furthermore, this functionality will need to be designed in such a way that it can be reconfigured for future regulatory and procedural changes. Moreover, it cannot be assumed that future changes will be insignificant; the recent changes in the Controlled Drugs prescription writing regulations represented a potential major change in the functionality of any electronic system designed to support the prescribing process for CDs.

Maintenance of system data

The baseline specification indicates that the medicines data to support prescribing activities and prescribing decision support within the system will be supplied from an approved third-party data supplier. This will ensure the quality, consistency and currency of medicines data in the system. It is expected that other data inventories, for example, diagnostic tools and disease rating scales, will be set up by local service providers (LSPs) and will be appropriately coded and validated. However, there are some areas in the specification where a national standard list of data items is mentioned, but there is no mention of who, or what organisation, will define these. An example is the data field “reason for prescription change”.

Furthermore, with all aspects of EP system data, there will be a need for ongoing maintenance of the data. Although it may not be clear at present which organisations will maintain different parts of the dataset, there will need to be clear agreements and procedures concerning the ownership and ongoing maintenance of system data. Some of the data, eg, details of medicine formulations and pack sizes, flagging of alerts for sensitivities and drug interactions, etc, will be clearly the responsibility of the third-party data supplier. Some of the data, eg, disease rating scales and algorithms, would best be maintained at a national level, under the auspices of Connecting for Health. However, some of the data, eg, local and specialty specific formularies, would need to be maintained at trust level. It is likely that this maintenance task will become the remit of local pharmacy staff since they will have the detailed medicines knowledge to perform the task. Moreover, it will not be possible to provide detailed decision-support functionality in specialist clinical areas such as, eg, anaesthetics and mental health, without some maintenance activities at trust level.

Support for clinical pharmacy and medicines management

The specification describes potentially useful clinical pharmacy and medicines management functions that could effectively support medicines management for the clinical pharmacist or technician, for example, intervention recording, therapeutic drug monitoring, compliance aid management, worklists for pharmaceutical care activities and templates for pharmaceutical care plans. However, it should be emphasised that the clinical pharmacy domain belongs to hospital pharmacy alone and that it is unlikely that any expertise in this area lies outside the NHS. It is essential therefore that pharmacists and technicians take ownership and drive the requirements in this area in order to get the most appropriate software.

Use of hand-held technology by pharmacists

With the availability of medicines reference sources such as the BNF, Lexi-Drugs and Micromedex as PDA downloads, clinical pharmacists have, for some time, had medicines information sources available in an electronic form for immediate use in wards or clinics. However, the functionality described in the baseline specification, where patient medication prescription and administration records can be viewed on a PDA or other hand-held device, with third-party medicine reference sources available on the same device, opens the way for more clinical pharmacists to be involved with near-patient clinical activities. These might include, for example, history-taking, identifying monitoring requirements, adverse drug reaction investigations and producing pharmaceutical care plans. These activities would be enabled by the immediate availability of the patient’s medication record at the bedside and the ability to enter new information against the patient’s record at the time of interviewing the patient. This development has the potential to revolutionise the working life of clinical pharmacists — by changing the way that they do their current work and also by making new ways of working possible.

There are, however, some important risk considerations with hand-held technology for near-patient use. First, with hand-held devices, it would be easier to enter new information against a patient’s record and, while it is hoped that immediate data entry by a clinical professional might improve the accuracy of the data on the system, it might also be easier to record erroneous information in an indiscriminate way. Secondly, the limited screen size on PDAs and palm PCs means that careful consideration would need to be given to the design of display screens on these devices in order to avoid risks arising from illegible information or unclear display of forms, buttons, etc.

Volume of data available for professional decision making

As a routine aspect of their work, clinical pharmacists are

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conversant with the normal values of standard laboratory tests, i.e., those related to biochemistry, haematology, microbiology (antibiotic sensitivities) and specialist therapeutic monitoring (e.g., theophylline, digoxin). Various disease activity measures are routinely recorded, e.g., forced expiratory volume in one second values for asthma and blood glucose readings for diabetes, and pharmacists would use these for disease monitoring as a matter of course.

In current paper-based systems, this information often has to be retrieved laboriously from clinical notes. However, when fully implemented, the EP functionality proposed would capture a far greater volume of clinical data and would make it available to the clinical pharmacist for clinical decision making, at the point of access to the prescribing record. As well as data that pharmacists are used to monitoring, there would be parameters that many pharmacists have hitherto had less experience in interpreting (e.g., specialist disease scoring tools). Furthermore, some of the data will be available in real time due to interfaces with medical equipment and therefore some clinical values will be continuously changing.

As with the introduction of hand-held devices, the wider availability of data at the point of clinical decision making will facilitate the introduction of new clinical services and prompt new clinical interventions. However, pharmacists may well need to acquire new skills in data interpretation and the need to evaluate a broader selection of clinical data for a patient may lead to a paradigm shift in post-registration clinical pharmacy education. The availability of a large volume of data for evaluation at the point of clinical decision making could lead to a state of “information saturation” for the clinical professional, which could be a source of increased stress in daily practice.

Re-engineering the medicines supply process The specification proposes a number of functionalities that are intended to streamline the medicines supply chain. These would include:

- The electronic link from the ward to the pharmacy for placing orders
- Interface with the pharmacy computer system
- Automatic escalations for overdue medicines
- Support for newer stock control methods such as 28-day dispensing and patient’s own drugs
- Supply chain tracking in real time (viewable by patient)
- Medicine costs to be displayed throughout the supply chain

Many of these requirements may seem straightforward, but there are various implications of providing these functions. First, as many implementers have already found out, the interface of an EP system to an (existing) pharmacy practice in the UK is a major technical task in terms of interface building and data configuration. Furthermore, provision of price information for medicines is problematic, both in terms of appropriate adjustments for actual and notional costs, and maintaining the data in real time throughout the system at each point of the supply chain. Secondly, supply chain tracking which includes a wholesaler would require involvement of wholesaler systems’ staff and would link the electronic prescribing programme with the e-procurement agenda within the NHS, with the complexities that would involve. Thirdly, provision of supply chain information to patients, as the end-user, would potentially increase the number of disputes between the pharmacy department and wards concerning throughput issues.

It is highly desirable that an EP system should support the various stock control methods currently used in hospital pharmacy, i.e., 28-day dispensing, use of patients’ own supplies, etc. However, as with clinical pharmacy tools, this represents an area that is unique to hospital pharmacy and pharmacy managers should have an active role in the design of these functions.

Oncology and haematology Oncology and haematology prescribing are complex areas and, in many respects, are a special case within the electronic prescribing initiative. The baseline specification provides functional requirements for oncology and haematology prescribing, but this builds on functionality already defined in an earlier document produced by CfH (then the National Programme for IT) in 2005, much of which has already been developed by oncology system suppliers. Consequently, many cancer centres have chemotherapy and radiotherapy management systems from specialist software providers, such as Chonisys and Varian, and these already provide much of the functionality described in the baseline specification. Furthermore, following the benchmarking process for existing oncology systems conducted last year, it is likely that more implementations will take place.

The key question concerning the oncology and haematology functionality in the EP baseline specification is how long it will take for this functionality to be developed in the CfH systems to the point where it is comparable to that available in the specialist solutions that are currently on the market.

Conclusions In a recent review of electronic prescribing experience in the UK, a number of potential benefits of an EP system were identified. These included:

- Availability of a fully electronic prescribing history
- Improvement in legibility and completeness of prescriptions
- Improvement of hospital business processes due to electronic dissemination of prescriptions
- Availability of electronic decision support tools at the point of prescribing
- Comprehensive audit trail of prescribing decisions made
- Reduction in the rate of medication-related errors

These benefits had been demonstrated to a greater or lesser extent in the EP implementations to date in the UK. If appropriately and successfully implemented, the functionality described in the CfH baseline specification will contribute to benefit realisation in these areas. In addition to these benefits, the functionality described in the specification has the potential to enable a paradigm shift in clinical pharmacy practice in the UK. The full impact of the introduction of these functions, however, will depend largely on how the software is implemented and configured by the LSPs.

However, a number of facts are evident:

- Some of the requirements listed cannot be considered in isolation to the technical and hardware issues which underpin them
- The detailed design, implementation, configuration and testing of the software will certainly require the clinical knowledge and expertise of hospital pharmacists, both from a clinical specialty and a service management perspective
- The continuing development, configuration and maintenance of the systems will require input from pharmacy staff

In conclusion, the design and implementation of the baseline specification EP functions will represent a major workload for hospital pharmacists and, regardless of how this is funded, it will be a major burden on a service that has finite staff resources. Hospital pharmacy managers and IT specialist pharmacists should be considering these implications now before the CfH electronic prescribing programme progresses into the implementation phase. Likewise, pharmacists and clinical specialists within the provider organisations, in the IT industry and within CfH will need to consider how these issues will be managed during the implementation process and their likely effect on delivery schedules. Further communications from CfH on the progress of the e-prescribing programme are awaited with interest. If there is effective communication between all stakeholders in the software implementation process, then the electronic prescribing endeavour is more likely to be successful.

References