



EPRO DOCUMENT IMPORT SERVICE

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EPRO DOCUMENT IMPORT SERVICE

OVERVIEW – A MISSED OPPORTUNITY?

Many patient related documents exist in electronic form scattered across a trust – but they are effectively inaccessible – thus constituting a massive missed opportunity in the journey towards a paperless / paperlight environment.

Since the introduction of PCs to trusts in the nineties, it has become the norm to produce many documents (e.g. clinic letters, dictated summaries, ward round notes etc.) electronically, commonly using Microsoft Word. These are stored electronically in variable patterns on local shared drives across the trust.

The Epro document import service processes these historic documents from their disparate, varied format to organize them all under one source, organized by patient, specialty, date and author. In addition the content is fully searchable for research and audit purposes.

This is immensely popular with users, both as a independent transformative addition and in boosting the uptake of new methods of working such as the introduction of digital dictation.

Combining historic clinic letters and discharge summaries forms a summary EPR covering both the out-patient and in-patient activity.

CURRENT ISSUES

Historic clinic letters not widely available

Clinic letters are stored in the paper case notes. These are not always available at the point of care or decision making such as a review of a lab test result.

Historic discharge summaries not widely available

Discharge summaries are traditionally stored in the paper case notes which are not always available at follow up appointments or immediately at the point of an unscheduled A & E attendance. This can lead to unnecessary re-admissions.

Out-patient appointment start delayed

When letters are unavailable at a clinic appointment (because the case notes are not present) this can delay the start of the appointment while old letters are retrieved from secretaries.

Longer times in clinic create additional costs

- Clinical decision making such as lab result approval is compromised by missing information
- Re-admissions can be avoided with access to recent discharge summaries / letters
- Unavailable letters can delay patients at the start of their appointment
- Retrieving the data causes additional work for secretaries and clinic clerks / nurses
- Out-patient consultations without previous letters create patient safety risks, and take more time.
- Out-patient appointments take longer
- Consultations with information lacking increase follow-up rate

If patient appointment start is delayed, this can create additional costs due to knock on effects such as hospital transport difficulties.

Clinical information missing at care decision points

If the out-patient consultation proceeds without background information this increases the duration of the appointment (due to re-taking the history), and can lead to sub-optimal clinical decisions, and unnecessary subsequent appointments.

Information Governance issues re shared drives

Shared drives aggregate letters effectively but usually lack any controls to determine who has accessed letters, when and if any edits were made.

Shared drives do not follow a consistent storage pattern

Letters are typically stored in different patterns of folders / sub-folders by specialty. This makes it hard to find all letters for a patient without local (per specialty knowledge) of the patterns. This creates a risk that important letters may be missed.

Difficulty identifying groups of patients for recall

Identifying a group of patients such as Rheumatology patients on a particular drug for recall is a significant task involving trawling large sets of case notes or manually searching letters. The task is particularly challenging if patients span multiple specialties.

THE IMPORT PROBLEM – EXISTING STORAGE PATTERNS LACK CONSISTENCY

We have performed this document import exercise for several trusts and encountered a wide variety of patterns in document storage. It is difficult to predict what will be found until the letters are processed. The Epro document import service exists to address this problem.

Whilst the document structure may look semi-consistent to human eyes, to a computer, there can be many inconsistencies which must be accommodated. Thus the problem of import really resolves to one of pattern identification (the patterns are different for every specialty / trust) and the management of exceptions.

Common patterns

Pattern	Impact / general strategy
1. Single letter per Word document. Patient ID in filename and date as file attribute.	<i>This pattern is virtually never seen except when importing from letter stores in a pre-existing automated system, or which have been generated by an automatic tool / macro.</i>
2. Multiple letters per Word document, all	<i>This is the slightly more common pattern than 3.</i>

relating to the same patient and specialty.	<i>The first challenge is to identify the patient correctly. This may be possible from the filename, or else if not, it is necessary to attempt to use a pattern matching technique for valid patient numbers.</i> <i>The second challenge is to identify correct boundaries for splitting the document into individual letters.</i> <i>The third challenge is to identify a useful date for each letter.</i>
3. Multiple letters per Word document, all relating to different patients (e.g. from one clinic)	<i>The second and third elements from above remain, but there is an additional element of repeating the patient identification for each letter.</i> <i>If the patient number pattern matching technique is insufficiently reliable, it may be necessary to use additional methods such as checking for the presence of a surname (obtained from PAS), date of birth or postcode (obtained from PAS) in the text of the letter.</i>
4. Variable formats with multiple patterns or apparently ad hoc	<i>These patterns, or lack of them can only be dealt with on an individual basis, with a careful evaluation of risk / benefit / cost of import.</i>

Problems we have encountered before are:

1. Multiple letters per individual document (each document references one patient)
2. Multiple patients per document (typically a whole clinic)
3. Letters which lack a reference to any patient number (although obviously relate to a patient)
4. Difficulty in identifying the correct patient
5. Letters which appear to reference a real patient which is absent from the PAS e.g. because the patient has been merged, or patient deceased, or PAS has been culled
6. Letters in which it is unclear where the separation point should be (in 1)
7. Letters which lack a date
8. Letters with dates which are in the future, or are other obvious typing errors
9. Letters where there is no obvious addressee or author (frequently notes to internal staff)
10. Documents in old formats (e.g. Word 97 / Word Perfect or earlier)
11. Password protected documents which cannot be opened
12. Documents which cannot be opened because they are corrupt
13. Letters which are, in fact, a secretary's personal shopping list

APPROACH TO PROBLEMS

We have separate strategies for dealing with all these problems, and these can be discussed, should you decide to take the process forward.

Approach to import – automated and manual over multiple stages

The key to an efficient (and therefore commercially achievable) import is to use as much automation as possible, and pick the right balance as to how much human intervention is required. We have developed a comprehensive set of tools designed to deal with the problems above.

The first toolset processes a large volume in a fully automated method, and identifies a small set of problem documents. These are processed with human intervention by a second set which optimises the time required. A third set carries out additional validation and imports them to Epro.

Automated high volume first pass

For each specialty we would manually sample a small set of letters and look to identify the split patterns etc. It is important to do this on a per specialty basis as there is rarely consistency between different groups of secretaries. The patterns would then be configured in the splitting tool, and a first pass process of a sample of the specialty batch done. We would then follow an iterative approach on small batches until we are able to achieve an automated splitting success rate of between 85% to 98%.

Manual correction

Depending on the volume / type of failures and / or approach taken by the trust, we will then process the failures with human input to correct errors. The most common cause is difficulty in identifying a suitable split point.

Meta information – a minimum of patient id and date

We would need to agree a minimum standard of meta information to permit import – and this is usually only

- A validated patient id
- An approximate date of letter production

Additional meta information which may be available is specialty, addressee, author. Addressee and author are usually uncoded. Whilst it is possible to look for additional meta-information, it is technically challenging because of the degree of heterogeneity, and this tends to lead to a poor ROI for the extra effort involved.

Search and retrieve ability not compromised

Once imported, the body of the letter is converted to text and indexed to give the same search functionality for keywords as other letters created within Epro.

Power of searching – a research resource

We believe importing a body of letters like this creates many opportunities for research into retrospective data and would like to see this better used.

Quality control

The automated tools described above produce statistics on the success/failure of import. All failures are output to a separate directory so that these can be processed.

It is impossible to check each individual document, so the only practical way of managing risk/quality is to develop a plan to sample a subset of documents looking for errors, and to collaborate closely with the trust's quality team in attempting to predict the possible errors which may occur.

One must also accept that, for various reasons, the import will be less than 100% perfect. However, the benefit of > 99.5% successful import considerably outweighs that of no import.

Our system has built in tests to monitor failed imports and alert us as to the reason that these have failed. All failed documents are collated in separate folder to enable analysis and resolution of the failed import.

Part of the service we offer is to work closely with the trust until they are satisfied that the imports have all worked and that they have been referenced successfully before signoff.

IMPORT PROCESS FEATURES

FEATURE	BENEFIT
Multi-document files split into individual documents in Epro	This provides a single view of the document library to enable fast identification of relevant letters
Relevant patient identified for each document	All documents for a patient available with one click. Saves time searching through multiple folders across multiple specialties.
Date identified for each document	Can access documents in chronological order.

All	A & E	Discharge Summaries	Letters
Filters	keywords	Author	<all authors>
Date ▲		GP	Subject
08 Jan 2008	issued		New - unexplained abdo pain
16 Jun 2008	issued		DNA - refer Dr. Wright again
14 Jan 2009	issued		Adm. Abdo. Pain - try spinal cord st
17 Mar 2009	issued		IDDM, Pancreatic insufficiency, Gas
17 Sep 2010	issued		Refer for temp Gastric pacing
17 Dec 2010	issued		DNA at joint pancreatic clinic
18 May 2011	approved		Successful trial gastric neuromod

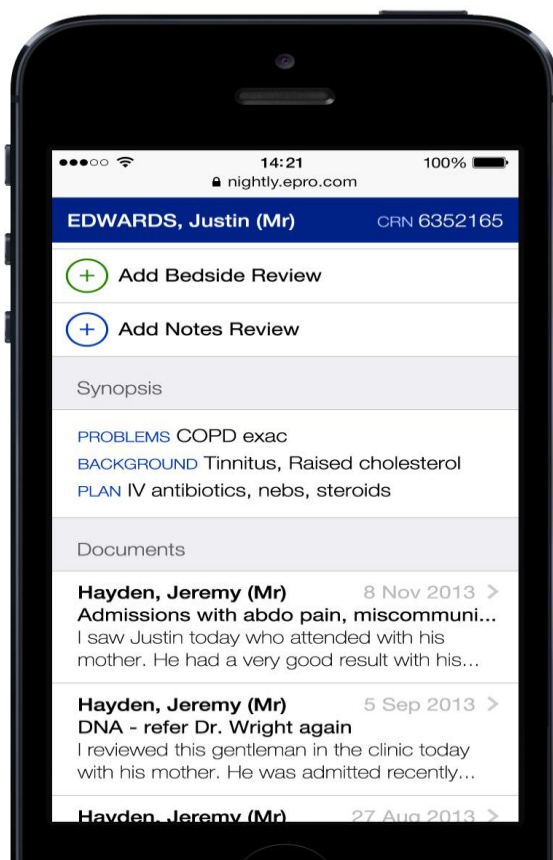
documents organized by date

Specialty identified for each document

Documents	add	view	print
All	A & E	Discharge Summaries	Letters
Filters	keywords	Author	<all authors>
Date ▼		Specialty	Subject
10 Nov 2011	issued	general surgery	Letter
04 Oct 2011	issued	cardiology	clinic
18 May 2011	issued	general surgery	Succe
17 Dec 2010	issued	general surgery	DNA :
03 Oct 2010	issued	dermatology	Derm
17 Sep 2010	issued	general surgery	Refer
17 Mar 2009	issued	general surgery	IDDM

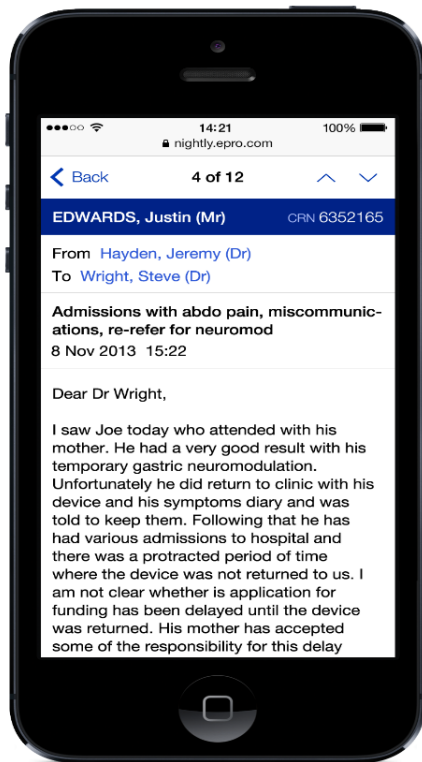
All A & E Discharge Summaries Letters			
Filters		general surgery	Author <all authors>
+	Date		Specialty
+	10 Nov 2011	issued	general surgery
+	18 May 2011	issued	general surgery
+	17 Dec 2010	issued	general surgery
+	17 Sep 2010	issued	general surgery
+	17 Mar 2009	issued	general surgery
+	14 Jan 2009	issued	general surgery

Documents filtered to one's own specialty or author



Document text and meta-data extracted to increase usability of display on a mobile device.

Document text extracted to permit specialist reading views



Reading view on a mobile device

Document text extracted to permit searching (per patient)

Documents add view print

All A & E Discharge Summaries **Letters**

Filters Author

Date	Subject	Owner
17 Jul 2011	transcribed Admissions with abdo pain, miscommunications, re-refer for neuromod Dear Dr. Wright Mr. Joe BLOGGS - (02 May 1985) - NHS No: 643 546 1236, Hospital Nos: 1544897 14 Pasture Way, Leeds, LS1 1AA I saw Joe today who attended with his mother. He had a very good result with his temporary gastric neuromodulation. Unfortunately he did return to clinic with his device and his symptoms diary and was told to keep them. Following that he has had various admissions to hospital and there was a protracted period of time where the device was not returned to us. I am not clear whether is application for funding has been delayed until the device was returned. His mother has accepted some of the responsibility for this delay and I have apologised for any inappropriate advice or miscommunication that may have been given from our point of view. Hopefully this puts this particular issue behind us. Yours sincerely	Hayde
18 May 2011	approved Successful trial gastric neuromod Dear Dr. Wright Mr. Joe BLOGGS - (02 May 1985) - NHS No: 643 546 1236, Hospital Nos: 1544897 14 Pasture Way, Leeds, LS1 1AA I saw Mr Bloggs in my clinic today. He had a 15 day trial of temporary gastric neuromodulation with an endoscopically placed electrode. He responded very well to this trial and reports about 80% improvement with his back ache, nausea, bloatedness, abdominal pain and bowel habit. As such I think that we should progress to an implantable gastric neuromodulator. He suffers from insulin dependent diabetes and the results of gastro-neuromodulation for diabetic gastroparesis tend to be particularly favourable. We will need to apply to the PCT exceptions panel for funding prior to making a definitive plan for the implantable device	Hayde

Illustration of instant search of one patient's letters to identify those which refer to 'neuromodulation'

Document text extracted to permit searching (all patients across trust)

Powerful tool to support audit, research, recall of groups of patients.

Source: Documents

Content contains:

Add filter:

GP

17 Mar 2011 **BLOGGS, Joe (Mr)**

Letter (9)
Dear Dr. Wright

Mr. Joe BLOGGS - (02 May 1985) - NHS No: 643 546 1236
14 Pasture Way, Leeds, LS1 1AA

Patient diagnosis - Mr Bloggs has an extremely difficult and severe pancreatic insufficiency with **diabetes** mellitus that r severe **gastroparesis** (delayed emptying of the stomach). I abdominal pain, nausea and frequent vomiting. These symp

What would be standard intervention at this stage - Presently, there is no effective and reliable as standard treatment for **gastroparesis**. Gastric promotility agents, such as Domperidone and Erythromycin, are helpful in some cases but have not been effective for Mr Bloggs. Tube feeding, via a nasal jejunal tube, has been effective in Mr Bloggs's case in terms of ameliorating his symptoms to a very large extent and providing regular nutrition. However, this entails the constant placement of a feeding tube and the

- diabetes AND neuropathy
- diabetes OR NIDDM
- Exclusions e.g. neuropathy NOT diabetes (note that you cannot use NOT on its own)
- "diabetes insipidus"
- Grouping: diabetes AND (mellitus OR insipidus)
- Multi-character wildcard e.g. hyp*thyroid [matches hyperthyroid and hypothyroid]
- Single character wildcard e.g. diab?tes

Illustration of combined keyword search across all specialties

PRE-REQUISITE EPRO MODULES

The Epro document import service requires the Epro core module and one or more of the Epro correspondence, clinical noting or discharge summary modules.

EPRO MODULES ENHANCED BY EPRO DOCUMENT IMPORT SERVICE

EPRO CLINICAL CORRESPONDENCE MODULE benefits from the document import service historic clinic letters may be imported. This leads to wider early acceptance of the module. In a clinic appointment context it is immensely powerful for the clinician to be able to make a rapid appraisal of the historic clinic picture as summarised in previous clinic letters.

EPRO DISCHARGE SUMMARY MODULE benefits from the document import service as historic discharge summaries may be imported. This leads to wider early acceptance of the module, and when combined with import and the correspondence module, the three elements provide a 'summary EPR' with widely available access to both in-patient and out-patient activity.

BENEFITS SUMMARY

Patient care benefits as

- **Critical information is widely and instantly available**
- **There are fewer clinical errors due to lack information**
- **Fewer delays commencing treatment whilst waiting for case note availability**
- **Improved care 'yield' from initial referral appointments**

Staff well-being is improved because

- **Frustrations arising from missing critical patient information are removed**
- **Staff experience fewer distractions / interruptions from requests for patient information**
- **Clinicians acquire a powerful research resource with searchable documents**

The Trust benefits from

- **Increased productivity from staff who spend less time hunting for information**
- **Increased strategic maturity in IT with the ability to include a significantly greater proportion of historic data in future EPR systems**

- **Improved Information Governance / and data protection policy adherence with the removal of relatively unregulated / unaudited access to large volumes of data on shared drives**
- **Shorter treatment pathways as referrals may be more appropriately triaged with additional historic information**

Reductions in unnecessary follow up appointments arising from lack of information

EPRO MODULES SUMMARY

Epro is built on a modular system that allows trusts to control which features they use and which they don't. In addition to the core module and digital dictation, there are 13 modules that can be added as required, enabling a tailored solution for hospitals' requirements.

EPRO CORE is the starter module for any configuration of the Epro clinical toolkit. It includes patient demographics, GP and GP practice demographics, Powersearch, the Epro template engine, a user module with granular security framework, user activity logging, audit, server based generation of word documents and basic reporting facilities. The HL7 interface allows trusts to monitor and track all inbound HL7 messages, and the responses sent by Epro and any failures. There is the option to edit message failures to correct issues and resend them. End users are able to author their own help material to be integrated into the Epro help centre and adjust some help related configuration settings.

EPRO DIGITAL DICTATION MODULE integrates Epro with digital dictation systems to allow the capture of dictation directly into templates, and /or the transcription of dictation. It also extends the reporting available on digital dictation across the whole letter production process.

EPRO ADMISSIONS MODULE allows the transfer of admission / discharge data from the PAS via HL7 messages. A patient's admission status is displayed integrated with other core features such as Powersearch and lists by consultant / ward / specialty. Admissions data can be updated in Epro on a configurable basis. This also adds the capacity to view clinic appointments in calendar format, as clinic lists and also on a per-patient basis. Also, Epro provides a retrospective view on all previous admissions of the patient.

EPRO CLINICAL CORRESPONDENCE MODULE allows capture and production of clinical letters using templates in a web-based template engine or Microsoft Word and includes electronic review / approval and reporting on workflow.

EPRO DISCHARGE SUMMARY MODULE allows the capture and production of discharge summaries and also includes a discharge tracking module for management and reporting of discharge workflow. It includes a drugs module to support adding, managing and screening of drugs. The module also allows the recording of drug and medication histories. It includes the national CfH drug dictionary (D, M + D), a local formulary module and the possibility to create and manage order sentences on a per-trust basis. The included drug decision support adds decision support such as allergy checking, dose range checking, drug-drug interactions and drug doubling alerts.

EPRO ADVANCED PATIENT SECURITY MODULE adds extended security features to allow per patient, per specialty or per item security restrictions to be implemented in a sealed envelope model. It includes full audit and exception log management and reporting.

EPRO ALERT MODULE enables trusts to configure, add and display alerts that allow indications of specific problems or conditions affecting a patient such as "End of life", "Do not resuscitate" or "Sick patient". Ageing and automatic removal for each Alert is configurable on a per-trust basis.

EPRO BED MANAGEMENT AND WARD WHITEBOARD MODULE is a graphical view of ward based admission lists. It replaces traditional whiteboards, and is a powerful tool to support real-time bed state, bed

management, handover lists and discharge summaries. The Bed Management module provides visibility of current and immediate future bed occupancy across a hospital. It allows managing bed types, transferring patients to wards or beds, configuring bed layouts in a ward and the efficient monitoring and management of available beds. It is usually combined with handover lists using admissions, transfers and discharges.

EPRO ELECTRONIC DISTRIBUTION provides a unified letter distribution mechanism for trusts. It includes a capability for dual signature letters, the capability to restrict who authors or approves letters and extended letter cloning functionality. Default distribution routes and optional additional permitted routes for each recipient make correspondence workflows more efficient.

EPRO LAB RESULTS & INVESTIGATIONS permits capture, storage, retrieval and reporting on lab results, radiology data, photos, ECGs or graphs.

EPRO HANDOVER LIST MODULE allows the recording of key clinical information on patients, and the ability to organize patients on to lists, both pre-defined and custom user designed lists. Medical and Nursing handover is combined with specialist options for each, and the whole is integrated with a discharge planning element to aid in managing length of stay.

EPRO PERSONAL CORRESPONDENCE MODULE adds templating, review and approval functionality to the core module including integration with digital dictation. This is designed especially for non-patient and internal communication.

EPRO REPORTING DASHBOARD MODULE extends the range of reporting available in Epro to enterprise level. It comes with a range of pre-configured reports together with a customization package to tailor reports to local requirements and can be used to report on the data from any of the other modules.

EPRO TASKS MODULE permits capture, storage, retrieval and reporting of free text, or structured template form clinical notes, including general notes, referrals, OPCS coded procedures and telephone notes. It enables users to set up tasks with different priorities, allowing to filter by user, due date or state of completion. The tasks module also provides one click access to correspondence and individually tailored reporting on workflow on a per-user basis.

EPRO TEMPLATING MODULE provides users with the possibility to create and manage both print templates, which determine the final appearance, and underlying templates, which determine the appearance of the interface for letter creation. This allows individually designed letter edit on a per-trust, per-specialty or per-user basis.