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5. Data transfer

Electronic medical records typically consist of a combination of text and coded entries which are organised "architecturally" by a variety of other structural features which may include clinical headings, encounter groupings, problem linkage, templated entries, and a number of clinical qualifiers such as "uncertainty" (e.g. definite, possible, definitely not), "temporality" (e.g. first, ongoing, last etc.), or "currency " (e.g. active, inactive, dormant, past etc.).
Throughout the rest of this section, data transfer refers to the transfer of such structured data and not, for instance, the transfer of e-mail information or attached word processor documents. These areas are covered in Chapter 6 of these guidelines.
When such record data is transferred, it is possible that clinical meaning may be corrupted or even fundamentally altered as a result of the transfer process. This in turn may have an adverse effect on clinical good practice or patient safety. It is the intention of this section of the good practice guidelines to reduce or eliminate the potentially adverse consequences of imperfect data transfer.

5.1 Categories of data transfer

Transfer of clinical data may occur in a number of different ways each of which has different potential consequences for the integrity of that data. In principle, the following sorts of data transfer may occur;

Transfer of data when migrating to a new software system

Transfer of data when moving to a new version of the same software system

Transfer of data by electronic messages between different systems

Transfer of data by incorporation of information from a remote system

All of these categories of data transfer carry risks of loss of data integrity but their effects on good practice are somewhat different. Each is discussed separately in what follows;

5.1.1 Transfer of data when migrating to a new software system

When practices change their software suppliers either as a result of their own choice or of wider PCO policy, there will inevitably be some loss or modification of information as a result of incorporation of the old data into the new software system. That loss will occur as a result of one or more factors which include;

5.1.1.1 Code mapping

If the coding schemes used on the old system are different from those on the new one (e.g. 4-byte and 5-byte Clinical codes or different medication codes), there will normally be a requirement to map the old codes into the new versions. Such code maps may be imperfect particularly when performed as a "one-off" exercise at the time of migration (as opposed to using tried and tested mapping tables). This may result in historical information present in patient's records being given new and inaccurate meaning.
It is also important to recognise that the existing "historical" information may itself be inaccurate (if, for instance, it had already gone through one erroneous data mapping exercise) and the process of mapping a historical code with an erroneous attached rubric produces a new "correct" version which, nonetheless, was not what was originally entered into the record. In either case the result may be, for example, that a

patient is recorded as having a coded diagnosis that is incorrect, or as being on medication that has not really been prescribed.
In the case of GPASS many of the “comments” will not be associated with any Read Term. Where such data is converted to an alternative system, suppliers may opt to attach all “comments” to a generic Read Term. Alternatively it may sometimes be possible for the practice to “map” comments text to Read Codes although this can be very labour intensive.

5.1.1.2 Alteration of data view

It will almost always be the case that data transferred from an old system to a new one will appear different to the old information at the point of viewing. This is because no two existing systems are exactly the same in the way they organise that data in the user interface. This may make it difficult for a reader of that information to interpret it in the same way as was intended by its original author. Occasionally it may be difficult to make any sense of the new data.
Furthermore, "navigation" through such a new record will not normally be similar to that in the old and there is no guarantee that, for instance, information that would previously have been reliably present on "screens" in the old system will still be present on "screens" on the new one even if those screens are apparently for similar purposes such as the aggregation of laboratory results or medication allergies.
Similarly, the internal management of problem orientation or encounter grouping varies from system to system. This may result in record information being presented in unfamiliar ways or in that information being "lost" to a user who is unable to navigate through the new interface.

5.1.1.3 Alteration of data meaning

This may occur in a number of ways other than those of flawed code mapping or alteration of view. If, for instance, the old record system allowed for the qualification of coded diagnoses as uncertain or negative (e.g. possible Myocardial Infarction or Myocardial Infarction excluded) and those qualifying codes are not recognised or supported on the new system, then this may result in diagnoses previously qualified as only possible or definitely not present appearing as if had been confirmed or asserted at the time.
Similarly, it is possible on some systems to qualify coded information with text which is spatially associated with the code meanings (e.g. Text "Father has" Code; Diabetes Mellitus) That visual association between text and code meaning may not be preserved on transfer thus giving the impression in the case of this example that the patient rather then the patient's father has diabetes.
Finally, information that had been marked as "deleted" or inaccurate on the old system may be carried forward into the new system without that marker being recognised, thus making apparently live and current what had previously been deemed to be irrelevant or erroneous.
In all the above cases, computer generated reports on the new system will tend to misrepresent the incidence of such coded information as a result.

5.2 Transfer of data when moving to a new version of the same software system

New software versions do not normally affect the meaning of information present within existing patient records since they normally deal only with things like software

bugs or new functional modules. Indeed, most changes to software version are typically unnoticed by the average user. However, if the new software versions specifically include changes to the internal record structures such as a new coding scheme (e.g. upgrading from 4 to 5-byte Clinical codes) or a change in the way record information is presented to the user, then similar difficulties may arise to those that may be found on transferring from one system to another. The NHS plans to move its main coding system from Read to SNOMED CT in the next few years and this will affect all system users, even if they are not changing system. A mapping exercise will be undertaken to try to ensure that Read terms are substituted with the most appropriate SNOMED concept, but this process risks changing meanings as understood within practices. These risks should be lessened by the scale of the migration which should help to ensure well planned mapping tables, but it illustrates that simply staying with the same software supplier does not necessarily mitigate the risk to practices' data.

5.2.1 Transfer of data by electronic messages between different systems

Clinical data transfer by means of electronic messaging is not yet a widespread means of conducting business in the NHS. With the exception of pathology results messaging, few practices receive information from outside their own organisations by these means. However, the intention is to introduce electronic commerce into the wider organisation so that GPs can expect to see the development of electronic information flows such as referral and discharge messages, radiology reporting, electronic prescribing and GP2GP record transfer in the near future.

When clinical information is received electronically by a practice from an external source and in a "structured" form (i.e. the inclusion of codes, qualifiers and other organising information) then, in principle, the same potential difficulties may present themselves as when data is transferred as part of a software migration. For instance, if a hospital department codes its own records using a scheme such as OPCS4 and passes such coded information to a general practice as part of a discharge message, then those codes will currently need to be mapped to the Clinical code thesaurus if they are to be of any use to the receiver. Such a mapping will be performed either on the sending hospital system or in the receiving practice. In either situation, errors may occur.

Similarly, if the hospital system organises its information in a particular fashion (such as the spatial display of antibiotic sensitivities in a microbiology report, or the organising of categories of information in a discharge letter under particular clinical headings) there is a risk that that organisation may not be faithfully transferred within the message.

Furthermore, in the case of data transfer by electronic messages, there is a need to ensure that patient identifiable information in such messages is kept confidential. This will normally entail the encryption of such information while in transit.

As a general rule, the introduction of clinical message flows are based on standard specifications which are supported by a set of rules for communicating systems as to how to populate and translate such messages, and what communicating systems should and should not do when processing the information concerned.

However, it is always possible – particularly in the early stages of an implementation - that such rules may not be faithfully followed or may have been inadequately specified. Furthermore, some clinical message flows have been implemented

historically without complete specification or adequate guidance being given - resulting in the passage of corrupt or ambiguous information.
The responsibility for adherence to these rules rests with the system supplier concerned and the responsibility for their formulation and conformance testing has historically sat with the NHS itself. However, it remains unclear where liability sits in the case of an adverse event arising from judgements based on flawed information – this is discussed further below under Data Transfer Liabilities.
Note; The case of GP2GP record transfer presents particular issues which are addressed specifically as appendix 2 of these guidelines, following work undertaken as part of the GP2GP record transfer project.

5.2.2 Transfer of data by incorporation of information from a remote system

The last category of data transfer consists of the active incorporation of clinical information from a remote system into a patient record by, for example, accessing a hospital system across the NHSnet for the purposes of reviewing a pathology result and then potentially "downloading" that result into the native record within the practice itself. As with clinical messaging, this is not currently a common way of supporting business for the majority of general practice. However, in some parts of the U.K. such services are made available by hospitals to their local general practices. For the most part, such remote access does not also entail incorporation by "downloading" of the information. Clearly, in such cases there can be no risks associated with data transfer since no data is being transferred.
However, it should be noted that such remote access on its own will not support the maintenance of the completeness of the patient records concerned unless there is some additional process (such as transcribing the content of a paper version of a report or an additional supporting clinical message flow). Without such a supporting process, readers of that patient record may not be able to tell that that information should be present within it. This will particularly be the case if the record is transferred to a new practice when a patient moves.
On those occasions where remote access also includes electronic incorporation of structured clinical data, the potential difficulties are the same as those that pertain in the case of clinical messaging in terms of code mappings, preservation of organisational structure and meaning qualifiers.

5.3 Data transfer liabilities

The issue of liability for the consequences of an adverse event following a corrupt or flawed data transfer is a complex one and the rules for determining such liability are not set either in general legislation, NHS terms and conditions, or in common law (although the latter is likely to be the arena in which such rules are formulated). For each of the above categories of transfer, the process includes a technical specification (formal or otherwise), an implementation of that specification (against which there may or may not be accreditation or conformance testing), a decision to procure the particular solution, and the resulting use of the solution by primary care team members for the purpose of care of their patients. Adverse events may occur as a result of a failure of any one or a combination of more than one of these factors. From the patient's point of view, the final link in this chain is the set of clinical decisions made in support of their own care and an associated assumption in their competence.

The last part of this section of the good practice guidelines is therefore not based on any particular liability assumption other than the general clinical obligation entailed under the "First do no harm" principle.

5.4 Data transfer guidelines

5.4.1 Software system migration

Practices will need to be prepared for the different look and function of a new software system. To that end, at least one responsible member of the practice will need to have a more detailed understanding of the consequences of migrating patient records from the old platform to the new one in terms of;

Any consequences of coding migration – particularly for medication codes or migration of any old local codes

Any consequences for the management of the routine business of the practice such as call-recall schemes/ payment claims/internal practice audit reports

Any consequences from a change in record architectures particularly those relating to meaning qualification, problem orientation or record navigation.

In addition, practices will need to ensure that all users of the new system receive adequate training in advance of the formal migration. Adequate training in this context should mean achievement of a high level of confidence that critical business processes such as consultation management, repeat prescribing and secretarial support may continue reliably immediately post-migration.
Clinical users of the new system should be aware in principle that old data will look different and be prepared to exercise a degree of caution when exercising judgements upon it. In particular, it should never be assumed that prescribing records can be carried forward in an active state from the old platform to the new one and all prescribing decisions, particularly for repeat medication, should be reviewed following the migration to the new system.
Practice computer based reports for internal consumption or routine business management should be reviewed for fitness for purpose based on the data structures on the new system.
Practices must remember that audit trails are not transferable between different clinical systems. Therefore they should create and maintain a verified backup of the clinical data from their old system, an initial backup post conversion, as well as regular back-ups from their new system.
Whilst this is best practice, it may be impossible in the future to recreate the record as it was originally, even with a verified backup at the time of conversion. As technology and software versions change restoring the original clinical system using the backed up data may become impossible due to loss of compatible hardware or software; lack of expertise with legacy systems; degradation or loss of the storage media. Practices should seek advice from their system suppliers (old and new), their PCO and medico-legal advisors on limiting the risks associated with system change.
It should be noted that, from a patient's perspective, the benefits and advantages of moving systems must outweigh the risks for the process of changing systems to be viable.

5.4.2 External electronic clinical data

5.4.2.1 Engaging in electronic commerce/transferring clinical data

As has been detailed above, the transfer of structured clinical information between systems is a process that has a number of potentially serious pitfalls. Before engaging in any particular electronic commerce activity that involves such a transfer, practices should take steps to ensure that the process is one of reasonable safety.

This does not amount to the unreasonable expectation that practices should have sufficient internal expertise to make judgements on the technical mechanisms to be used to support the process. However, the practice should be satisfied that appropriate mechanisms are in place to maintain the privacy of any patient-identifiable data concerned and that there is some form of accreditation or conformance testing of the technical mechanisms to be used that is designed to preserve the integrity of the data being exchanged. It will normally be the case that such conditions will be met where the electronic commerce is instituted as part of a formal NHS initiative but practices should exercise appropriate caution when engaging in informal initiatives or with the non-NHS sector.

It is vital that practices have documented robust procedures to ensure that all received external clinical data are brought to the attention of the appropriate clinician and acted upon.

5.4.2.2 Receiving external data

GP systems engaged in clinical electronic data interchange are required to provide functionality that allows GPs and other PCT members to review the content of external clinical reports such as pathology results or discharge messages before their incorporation into the relevant patient record. It is also a requirement on systems not to allow the filing of such reports into the record until they have been marked as viewed by a member of the practice. The rationale for these requirements is partly to support existing good practice for paper information flows (namely to ensure that a responsible clinician is aware of incoming patient information and able to take appropriate action upon it) but also to allow an informed human judgement as to whether or not the content of such incoming information is valid.

It is therefore important that responsible clinical users of systems review incoming electronic data not just for its impact on patient care but also to ensure as far as possible that it is not corrupted in some obvious way and to reject it if it appears so.

5.4.2.3 Retention of external data

GP systems are also required not to allow deletion or modification of incoming clinical messages without first creating a fully restorable archive of that message. Notwithstanding that technical precaution, practices should think carefully about the consequences of deletion of incoming clinical data from the record.

In addition, practices that use externally accessed record information for patient care (as in " Transfer of data by incorporation of information from a remote system" above) should take steps to ensure that this information will be available to any practice subsequently involved in the care of that patient. Paper copies of EDI transmissions (e.g. pathology results) do not need to be retained by practices.

Record retention and integrity issues are covered more generally in the Information Governance and Electronic Documents (Chapter 3) of these guidelines.

5.4.2.4 GP electronic record transfer

In the case of the receipt of electronic records from another practice, special considerations apply which are covered in appendix 2. Specific advice on GP2GP transfer will be made available as a supplement to these guidelines at www.connectingforhealth.nhs.uk/programmes/gp2gp/.
GPEX was the original title for the project in Scotland looking at GP to GP record transfer, particularly between GPASS practices. GPEX is now part of the GP2GP project, which should allow electronic transfer between all commonly used UK clinical systems.

5.4.3 Prescribing and data transfer

Current GP systems use a variety of coding schemes to store and represent medication information and a variety of idiosyncratic methods for allowing repeat prescribing management. Although it is not currently the case that practices are routinely in receipt of structured prescribing information from outside their own organisation (e.g. as part of a discharge message), this problem will be compounded when they are. This means that it is not currently technically possible to fully re-create prescribing records with 100% safety following data transfer of medication information.
Therefore, as a general rule, if data transfer from any of the above categories involves the transfer of medication information;
Following data transfer, medication information should never be included in an active prescribing record without review by a responsible clinician.