Developing an automated process of uploading immunoglobulin batch numbers to the UK National Immunoglobulin Database

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ABSTRACT

Objectives To develop a more efficient and robust process for entering patient-specific, immunoglobulin batch number data onto the UK National Immunoglobulin Database.

Methods A manual method of input, which relied on paper records, was replaced with an automated upload that was developed by linking the pharmacy dispensing system, JAC, with a number of information technology support systems to produce a batch number report. Both systems ran parallel for a period of 7 weeks, and administration time and completeness of data for both were analysed.

Results Over the 7-week period, 550 g of immunoglobulin would not have been entered using the manual method (=4108 g per annum; 4.66% of total immunoglobulin usage). The time taken to enter the data was reduced from 4 h to 30 min per week.

Conclusions An automated process of uploading batch numbers increases accuracy and completeness of data, reduces administrative time and risk of financial loss; therefore, significantly increasing efficiency.

administrative staff and manually entered onto the NID. This was a very time-consuming method that potentially missed batches if the paperwork was not completed or something went missing. To overcome this, we developed an automated process of uploading this information.

METHODS

MMPS at LTH, uses JAC Medicines Management V5.01 (Provided by JAC, a wholly owned subsidiary of MediWare) as a pharmacy dispensing and stock control system. JAC is built on an InterSystems Cache database, but presents a set of base tables, which can be queried using Structured Query Language (SQL), via Open Database Connectivity. We used the SQL server to develop tools to extract data from these tables. A JAC special consideration 'Record Batch Number' was added to all relevant Ig drugs. The result is that anyone dispensing one of these products is forced to input a batch number before the JAC programme will issue the drug/product label, and records this batch number on the base table ulmrbn_register. Using Microsoft SQL Server Management Studio, a linked server was created to reference the JAC database and a look-up table linking the relevant JAC drug names to the NID drug names. To extract the data, a stored procedure containing a SQL query, driven by the ulmrbn_register table, and referencing other tables, including the look-up table, was created. Using Microsoft Visual Studio, we created a report in Microsoft SQL Server Reporting Systems (SSRS) and deployed it to the MMPS report server, for access by authorised users. The resulting report prompts the user to enter a date range, and when the report is run, standard SSRS functionality allows it to be exported to Excel. The Excel spreadsheet can then be uploaded to the NID (V4.2 provided by Medical Data Solutions and Services) via the upload functionality. Any batches unable to be uploaded, for example, because the patient is not registered, is marked with a red cross on the NID. The user can then investigate the reason for this.

Having established the above, the paper system and the new automated process were run in parallel for a period of 7 weeks, and the outcomes of the two were compared.

RESULTS

Over the 7-week period, a total of 439 batches of Ig were uploaded to the NID; an average of 63 per week (table 1). We found that a total of 550 g of Ig would not have been uploaded onto the NID using

Immunoglobulins (Ig) are an important treatment option in a wide range of clinical conditions. Concerns over its availability to the National Health Service resulted in the Department of Health conducting a review to assess the opportunities available to secure its supply and develop a more evidence-based approach to its prescribing. One of the resulting work streams was a National Demand Management Programme that included the launch of a National Immunoglobulin Database (NID) in June 2008. The aim of the NID was to provide an accurate picture of prescribing for forecasting, tendering and tracking. Since its launch, the NID has continued to evolve, and has increased the volume of data it captures. All NHS users of Ig are required to input their data onto the NID.^{1–3}

The Leeds Teaching Hospitals NHS Trust (LTH) is a large user of Ig covering a wide range of clinical specialities and across five sites. In 2012 (January–December), LTH registered 305 new patients alone and used 101 116 grams of Ig.⁴ Every vial of Ig that is administered to a patient must have the batch number recorded on the NID to allow the system to be used for batch tracking and patient safety. LTH Medicines Management and Pharmacy Services (MMPS) historically used a paper method of documenting batch numbers at the point of dispensing. These papers were collected each week by a member of MMPS

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Table 1 Weekly summary of data uploaded

Week	No of Ig batches	No of patients with missing request forms	Total g of Ig dispensed	Missed g of Ig	Comments
1	55	0	1730	0	One patient's data not uploaded due to name change, ie, JAC and NID did not match
2	64	1	1445	270	Whole batch of paper infusion forms missing (240 g of the 270 g total missed)
3	57	0	1365	0	Duplicate photocopies of infusion forms that could have been entered twice.
4	62	0	1880	0	
5	61	2	1645	40	
6	73	1	1855	30	
7	67	2	1880	210	
TOTAL	439	6	11 800	550	

the paper method. Six patients did not have Ig Request Forms completed by the requesting clinician, and were, therefore, not registered on the database. The automated process highlighted these patients, whereas the paper method would not have, as there was no paperwork.

During the first week, it appeared that another patient was not registered, but after investigation it was noted that the patient's name had changed and, therefore, JAC and the NID did not match; this was therefore amended on the NID. Another week a whole batch of paper infusion forms were not present. This was found to be due to these being filed in an incorrect place and, therefore, would have been missed previously. It was also found that in 1 week, the infusion forms were photocopied twice and could have resulted in duplicate entries.

The time taken to upload the batch numbers per week was reduced significantly. The paper method took approximately 4 h per week to enter manually, depending on the number of batches dispensed in a particular week. Using the automated system took less than 30 min; maximum of 20 min reviewing the spreadsheet before uploading, and then less than 5 min uploading it to the NID.

DISCUSSION

Using the automated process increased the accuracy and completeness of data uploaded to the NID. The paper method would have resulted in six patients not being entered onto the NID, as Ig Request Forms were not present. This equates to 45 patients per annum. All six were for 'Red' indications, where specific approval by the LHT Immunoglobulin Demand Management Panel is not required (as per the Department of Health guidelines), and were for acute conditions, such as Kawasaki disease and Guillain-Barré syndrome. Compared with other conditions requiring Ig, these have a higher chance of occurring out-of-hours or at weekends where, due to a lack of familiarity with the Ig prescribing/dispensing process, paperwork can often be incomplete or filed incorrectly. With the automated process, these patients were highlighted as not being registered by being marked with a red cross during the uploading process. The immunology pharmacist was then able to investigate and ensure that the appropriate paperwork was completed before manually adding those patients/batches. The total amount of Ig that would not have been entered over the 7-week period was 550 g; equating to approximately 4108 g per annum. This is 4.66% of total Ig usage. With new commissioning arrangements, where trusts are only reimbursed for Ig recorded on

the NID, this would have been a significant financial loss. The risk of financial losses through missing batches is extremely low with the new process.³

The automated upload significantly reduced the time required to enter batch number data from 4 h per week to 30 min maximum; an approximate saving of 182 h per annum.

A major problem identified early on with the automated process was that returns of Ig did not show on the report. Same-day returns are likely to be due to labelling errors, therefore, within the SQL query, we added a check for same-day returns; any patient/drug combination for which there exists a same-day return is highlighted on the report. These can then be reviewed and the appropriate batch manually deleted before uploading. 'True' returns, which may occur days after the original issue, are not captured but are managed via paper forms.

A challenge we faced was ensuring that the extracted data was exported from SSRS to Excel in the upload file format required by the NID. This format featured two worksheets; the first containing an identification code, and the second holding the Ig data after some initial blank cells. An unprotected version of the example spreadsheet had to be requested from MDSAS, to enable us to see rows/columns hidden in the example version and so replicate the format. The uploaded file includes a patient identifier field, which is specific to the NID, and therefore not on JAC. However, at LHT, this field is derived from patient's initials and date of birth, so we were able to compose it automatically in the SQL query. As there is a risk of the derived identifier not being unique, we also included in the SQL query a check for potential duplicates. As with same-day returns, potential duplicates are highlighted on the report for further investigation.

Another drawback is that JAC will not recognise that a batch number is incorrect. For example, the dispenser could place 'X' in this field to bypass it. However, staff briefing on the importance of this process was carried out to reduce the risk of this occurring, and the batch row within the report was 'sense-checked' before uploading. With both processes, as the batch number is recorded at the time of dispensing, they rely on nursing staff returning Ig not administered to a patient, so that it can be removed from their record on the NID.

The concept of adding information to a patient's dispensing record could be used and extracted in a similar method for other medications, for example, batch numbers for unlicensed medicines, pregnancy testing results for teratogenic medicines.

In conclusion, an automated process of uploading batch numbers at the point of dispensing significantly increases the accuracy and completeness of data, reduces administrative time, and reduces the risk of financial losses.

Competing interests RH is Head of Medical Data Solutions and Systems (MDSAS) who manage the UK National Immunoglobulin Database.

Provenance and peer review Not commissioned; internally peer reviewed.

REFERENCES

- 1 Department of Health. Demand management plan for immunoglobulin use. 2008. <http://webarchive.nationalarchives.gov.uk> (accessed on 29 Jan 2015).
- 2 Department of Health) Clinical guidelines for immunoglobulin use: Second Edition. 2008. <https://www.gov.uk> (accessed 29 Jan 2015).
- 3 Department of Health) Clinical guidelines for immunoglobulin use: Second Edition update. 2011. <https://www.gov.uk> (accessed 29 Jan 2015).
- 4 Medical Data Services and Solutions) Third National Immunoglobulin Database Report. 2013. <http://www.ivig.nhs.uk> (accessed 29 Jan 2015).