AIM AND OBJECTIVES

To establish the level of patient satisfaction with the pharmacist headache telephone follow-up clinic

To develop and distribute a patient satisfaction questionnaire to 100 patients

To collate results from questionnaires to identify areas for improvement

METHODS

A questionnaire based on the Royal College of General Practitioners patient satisfaction questionnaire was developed. This uses a seven-point rating scale from ‘excellent’ to ‘poor’. The questionnaire included questions rating the pharmacists’ consultation skills and administrative aspects of the appointment. Free text space was available for general comments. Questionnaires were sent to 100 patients consecutively followed up between August and December 2010. Results were collated using a Microsoft Access database.

RESULTS

Replies were received from 47 patients. Of those, 81% (38) said that the reason for the follow-up appointment had been fully addressed, 13% (six) that it had not been addressed. Two patients did not complete this question. The majority of patients (93%) said that they would be happy to use the service again. Given the choice, 58% stated that they would prefer to be called by a pharmacist and 42% by a doctor.

In the comments section 13 respondents (43% of those making any comments) reported that they liked the telephone consultation as it saved time and/or money travelling to hospital. The main criticisms of the service related to administrative issues, eg, timing of appointments in relation to treatment. The ratings of the consultation skills are summarised in Table 1.

DISCUSSION AND CONCLUSION

There was a high level of satisfaction with the pharmacist-delivered service. There is increasing focus on optimising healthcare efficiency by minimising clinic visits while improving quality of care. The study shows patients value a flexible approach to their management. Medicines adherence is poor in chronic conditions, but can be improved with patient education and support. Our results, although limited by the small number of patients surveyed, shows that the pharmacist, as part of a multidisciplinary team, is well placed to improve adherence by providing information and support that increases confidence and
To audit the extent of non-adherence in patients with difficult-to-control asthma, we evaluated the clinical implications (ie, asthma control, lung function measurements, inflammation measured by sputum eosinophil counts and healthcare utilisation) of sub-optimal adherence.

AIM AND OBJECTIVES
- To audit the extent of non-adherence in patients with difficult-to-control asthma.
- To evaluate the clinical implications (ie, asthma control, lung function measurements, inflammation measured by sputum eosinophil counts and healthcare utilisation) of sub-optimal adherence.

METHODS
161 consecutive adult asthma patients attending the DAC during July and August 2009 were included. None of the subjects had non-adherence suspected and they were selected solely on the date of their appointment at the clinic. As part of routine clinical care, each patient’s GP was contacted to collect retrospective prescription issue data for asthma medicines over the previous 12 months. Further data were collected from the hospital’s dispensing computer over the same period. The data were collated and compared with the patient’s prescribed medication. Adherence to medication was defined as equal or greater than 80% of prescription issue rate calculated as the number of doses refilled/number of doses prescribed × 100 for a mean duration of 12 months.

RESULTS
Prescription refill data were available for 115 patients. Sub-optimal adherence (defined as <80% prescription refill) was identified in 75/115 patients (65.2%) on inhaled corticosteroids (ICS) overall — 63/101 (62.4%) taking combined ICS and long-acting β2 agonist (LABA) inhalers and 12/14 (85.7%) patients taking separate inhalers. In the 14 patients using separate inhalers, adherence to the LABA (50%) was significantly better than adherence to the ICS (14.3%) (P=0.043). Patients with sub-optimal adherence to ICS had a lower FEV1 (% of predicted) (75.4 vs 84.3; P=0.049) and higher sputum eosinophil counts (4.6% vs 2.3%; P=0.05) than those with adequate ICS adherence (Table 1). Furthermore, these patients were more likely to have been ventilated for asthma (P=0.002). In a multivariate logistic regression model, the adherence ratio was the only independent predictor of previous need for ventilation for acute severe asthma (P=0.008). This means that for each 10% decrease in adherence to inhaled corticosteroids, the estimated odds of having been ventilated for asthma increases by 1.35 times. Similar proportions of patients were sub-optimally adherent to leukotriene antagonists (30/42; 71.4%), antimuscarinic inhalers (22/29; 75.9%) and oral theophylline (23/40; 57.5%). Perhaps surprisingly, fewer patients were found to have sub-optimal adherence to oral corticosteroids (13/50; 26%) (chi-square 331; P<0.0001). Only 29/115 (25.2%) patients were found to be adherent to all prescribed medication. No significant differences in age, gender, racial origin, smoking history or prescribed doses of inhaled or oral corticosteroids were seen. There was no significant association between adherence with inhaled and oral corticosteroids (chi-square 0.68; P=0.48) suggesting that the sub-optimal adherence with ICS was not explained by good adherence with oral corticosteroids.

DISCUSSION AND CONCLUSION
This audit demonstrates that non-adherence in patients with difficult-to-control asthma is common. Non-adherence is limited not only to ICS and ICS/LABA combinations but evident also with oral preparations of montelukast and theophylline. Non-adherence with ICS medication in patients attending a DAC is correlated with several poor clinical outcomes, most notably a history of mechanical ventilation. Importantly, the use of inhalers containing both ICS and LABA appears to improve adherence to ICS compared with the use of individual inhalers. Measuring adherence to medication is worthwhile and achievable in clinical practice and should be routine in the assessment of patients with difficult to control asthma.

REFERENCES

Table 1: Clinical outcomes according to adherence ratio to ICS

<table>
<thead>
<tr>
<th>All patients (n=115)</th>
<th>ICS adherence ratio &lt;0.8 (n=73)</th>
<th>ICS adherence ratio ≥0.8 (n=40)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post bronchodilator FEV1 % predicted</td>
<td>75.5</td>
<td>84.3</td>
<td>0.049</td>
</tr>
<tr>
<td>Spirometric eosinophil count (μL)</td>
<td>4.6</td>
<td>2.3</td>
<td>0.05</td>
</tr>
<tr>
<td>Modified ICS</td>
<td>2.25</td>
<td>2.05</td>
<td>0.50</td>
</tr>
<tr>
<td>Hospital anxiety score</td>
<td>7.5</td>
<td>7.1</td>
<td>0.69</td>
</tr>
<tr>
<td>Hospital depression score</td>
<td>6.1</td>
<td>5.2</td>
<td>0.32</td>
</tr>
<tr>
<td>Niemann score</td>
<td>15.3</td>
<td>18.8</td>
<td>0.22</td>
</tr>
</tbody>
</table>

NAPP PHARMACEUTICALS ASThma AWARD 2011

The relationship between clinical outcomes and medication adherence in difficult-to-control asthma

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*Institute for Lung Health, Leicester, UK; †University Hospitals of Leicester NHS Trust, UK; ‡School of Pharmacy, Grenoble, France

Asthma is one of the most common chronic conditions worldwide, affecting about 300 million people and is estimated to account for about one of every 250 deaths. Most patients with asthma have mild disease that is readily controlled on low to moderate doses of inhaled corticosteroids together with a combination of short- and long-acting β2 agonists. However, between 5% and 10% of asthmatics have disease that is more severe and difficult to control. The causes of difficult-to-control asthma are complex. In many people sub-optimal adherence to prescribed medication is likely to be an important factor. Although the issue of sub-optimal adherence to therapy has been proposed as contributing to worsening control in this population, little is known about the precise relationship between adherence and clinical outcomes. Monitoring of adherence through collection of prescription refill data is routinely undertaken as a standard of care in the Difficult Asthma Clinic (DAC) to help guide future treatment options.

REFERENCES
3 Mulleners WM, Whitmarsh TE, Steiner TJ. Noncompliance may render migraine prophylaxis useless, but once-daily regimens are better. Cephalalgia 1998;18:52-6.
NOVARTIS ANTIMICROBIAL MANAGEMENT AWARD 2011

An integrated package of educational materials to support appropriate anti-infective prescribing at an Academic Health Sciences Centre (AHSC)

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*A Centre for Infection Prevention and Management, Imperial College London; †Infectious Diseases, Imperial College Healthcare NHS Trust, London

It is recognised that having up-to-date and evidence-based anti-infective prescribing policies is key to good antibiotic stewardship: NHS hospitals are required to implement such policies and audit them regularly.† It has been suggested that policies should be provided as pocket guides , and that multi-faceted approaches are likely to be effective. We describe the development, dissemination and ongoing review of a multiple-format antibiotic policy, and the development of a smartphone application (app) to broaden accessibility.

AIM AND OBJECTIVES

Aim: to develop, disseminate and review the impact of the multiple publication formats of the trust treatment of infection policy (TOIP).

Objectives: to conduct a multidisciplinary consultation/drafting process, with the resulting policy approved by the trust antibiotic review group (ARG); to disseminate the policy to doctors, nurses and pharmacists, in multiple formats; to feed back data to prescribers on compliance with policy, using twice-yearly point prevalence methodology and more frequent, smaller scale feedback where appropriate; to investigate staff usage of the policy formats and establish parameters for a smartphone app version of the policy; To develop, test and deliver a novel TOIP app according to user requirements.

METHODS

Policy development: From October to December 2008, a multidisciplinary consultation on the TOIP was held across the newly formed organisation. The antimicrobial pharmacist (AP) collated all contributions, plus national guidance and local antimicrobial sensitivities, to form a draft policy specifying antimicrobial choice, route, dose and duration. This was reviewed by ARG, consisting of infectious diseases (ID) and microbiology clinicians, specialist pharmacists, nurses and other clinicians. The TOIP was launched in January 2009, with consultation and review repeated annually (2nd and 3rd editions launched in January 2010 and April 2011).

Design and dissemination: Five policy formats were produced by the AP and a graphic designer: pocket booklets — given to all pharmacists, junior doctors on induction, senior doctors by post, and doctors and nurses on wards (8,000–10,000 copies/edition); A3 poster — displayed in all wards, clinics and doctors’ offices (>100 copies/edition); electronic PDF summary — downloadable from the intranet; Powerpoint slide set — for doctor, pharmacist and nurse training, and trust inductions; intranet version containing additional information to guide diagnosis and treatment. All formats shared a graphical theme. The launch of each edition was publicised using the trust newspaper and e-mail bulletins, teaching sessions and grand rounds.

Measuring policy compliance: Every six months, as part of an antibiotic point prevalence study (PPS), policy compliance data were fed back to prescribing teams. Additionally, since April 2010, more concise indicator data regarding adherence to antibiotic policy have been fed back to clinicians on a weekly or monthly basis. These data are collected by the ward pharmacists on their daily ward visits.

Assessing policy format usage and potential for a smartphone app: In June and July 2011, an anonymous survey was circulated to doctors, nurses and pharmacists using a combination of e-mail, personal approach and circulation to doctors’ mess rooms. This asked whether respondents were aware of the policy; which formats they preferred to use; whether they used smartphones at work; and if they would use a TOIP app.

Development of a novel app: An external software developer was brought in to work with the team, and the resulting app was tested by pharmacists, junior doctors, and IDmicro consultants and registrars. Feedback was positive, and we incorporated many suggestions from the survey and testing phases into the final product (eg, calculators for creatinine clearance and obese dosing for aminoglycosides). In addition, the app is fully searchable by drug and disease and incorporates a button to provide feedback for input into the 2012 edition. Access to the download is password-protected, and a disclaimer warns users that this is for local use only.

RESULTS

Policy compliance: Results from the five PPSs since January 2009 showed that compliance increased from 77% in 2009 to 87% in 2011 (Figure 1). By March 2011, the electronic PDF version of the policy was receiving over 800 hits per month.

Staff survey: Ninety-three completed forms were received from across the organisation: three-quarters (76%) from doctors, 17% from pharmacists, and the remainder (6%) from nurses and assistants. Awareness and usage of the policy and smartphone usage is described in Table 1.

DISCUSSION AND CONCLUSION

Since introduction of the first edition of the policy in 2009, there has been an increase in prescriber compliance; this is likely to be due to a combination of increased awareness due to educational and publicity measures, the effects of feeding back data on prescribing behaviour, and the policy being developed “by clinicians for clinicians”. Following the results of the staff survey, it became apparent that there was demand for an app. As 90% of smartphone

Table 1: Awareness and usage of TOIP formats, and use of smartphones

<table>
<thead>
<tr>
<th>Type of smartphone used</th>
<th>Total</th>
<th>Doctors</th>
<th>Pharmacists</th>
<th>Nurses</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPhone</td>
<td>73</td>
<td>63</td>
<td>58</td>
<td>5</td>
</tr>
<tr>
<td>Android</td>
<td>17</td>
<td>15</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Nokia/Palm/Blackberry</td>
<td>10</td>
<td>9</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 1: Percentage compliance with antibiotic prescribing policy

May ’09   Nov ’09   May ’10   Nov ’10   May ’11

70  80  90  100

60

50

40

30

20

10

0
users used either iPhone or Android devices, the app was optimised for these. There are plans to develop a Blackberry version. We believe that the app is a sustainable and efficient way of providing access to the current policy; users will automatically be prompted to update the app when it is replaced by a newer version.

In conclusion, we worked in a multidisciplinary team to introduce a multiplatform antimicrobial prescribing policy, including a novel smartphone app. The policy was well liked and used by clinicians, and adherence to policy has increased since its introduction. Promoting point-of-care access to the policy increases the likelihood that it will be used.

REFERENCES

SANOFI AVENTIS DIABETES AWARD 2011

A multidisciplinary audit on the safe discharge of patients on insulin from hospital

N. K. Bring
Bedford NHS Hospital

Insulin is a high-risk drug for serious or fatal outcomes. The National Patient Safety Agency recorded more than 13,000 insulin-related reports from November 2003 to March 2009. The most common insulin errors related to dose (strength/frequency), omission, incorrect medication and quantity. Inadequate supply of medicines on discharge may increase the risk of medication omission. Evidence shows the following can reduce medication-related errors during transitional care:

- Effective communication with patients, carers, GPs, etc.
- Adequate education and support, eg, patient counselling
- Advance planning of discharge to establish individual needs, eg, provision of sufficient equipment

The use of a checklist has been proven to improve adherence to safety procedures in a healthcare setting. At Bedford Hospital a checklist was used to enhance the above safety measures at discharge.

AIM AND OBJECTIVES

Aim: This baseline audit aims to measure current standards of practice when discharging patients on insulin from Bedford Hospital, including use of an insulin discharge checklist to aid safe discharge.

Objectives: Confirmation of 100% achievement of the following audit standards: (1) correct insulin preparation (device) on the discharge letter; (2) correct insulin prescription on discharge letter; (3) correct and adequate injecting equipment supplied at discharge; (4) patient counselled on insulin prescription and administration technique at discharge; (5) completed checklist filed in patient’s medical notes.

METHOD

A discharge checklist was devised and initiated to the wards by ward pharmacists six weeks before data collection. Over a three-month period medication discharge summaries received during pharmacy opening hours for patients being discharged on insulin were attached with the checklist. A record of these patients was kept in pharmacy to enable follow-up data collection by the diabetes pharmacist from medical notes post-discharge. The diabetes specialist nurse completed data collection via a follow-up phone interview with the patient or their carer approximately a week after discharge. All data were entered onto an electronic audit pro-forma.

RESULTS

From a total of 36 insulin discharges, 29 (80%) had checklists filed in notes, of which six were complete (Standard 5). 100% of checklists confirmed correct preparation and prescription (Standards 1 and 2) on the discharge letter. Seven patients (24%) were confirmed to have adequate injecting equipment (Standard 3). Nine patients (31%) were confirmed as receiving counselling (Standard 4).

Follow-up phone interviews (Table 1) were with 32 (89%) patients.

<table>
<thead>
<tr>
<th>At discharge did nursing staff check:</th>
<th>Yes</th>
<th>No</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient has correct insulin and device</td>
<td>20 (62%)</td>
<td>4 (12%)</td>
<td>8 (25%)</td>
</tr>
<tr>
<td>Patient has adequate supply of equipment</td>
<td>20 (62%)</td>
<td>9 (28%)</td>
<td>3 (9%)</td>
</tr>
<tr>
<td>Patient is able to use device</td>
<td>21 (65%)</td>
<td>7 (22%)</td>
<td>4 (12%)</td>
</tr>
<tr>
<td>Patient is aware of current dose</td>
<td>21 (66%)</td>
<td>8 (25%)</td>
<td>3 (9%)</td>
</tr>
</tbody>
</table>

DISCUSSION AND CONCLUSION

Standards 1 and 2 were fully met. This result may be attributed to the pharmacist’s responsibility to complete and attach the checklist to the discharge summary. A comparison with the total number of insulin discharge summaries received in pharmacy would provide an accurate representation of adherence to this standard; this, however, went beyond the scope of this audit.

Standards 3 and 4 were not completely met. There was an unexpected visible difference between the results from the telephone interviews and the checklist. A comparison of the average “yes” or desired outcome for counselling and supplying injecting equipment was 64% from telephone interviews compared to 28% from checklist. This difference may be attributed to the patient’s perspective of received rather than actual care delivered. In 22% of cases patients confirmed that staff did not check their ability to use their device at discharge. Confirmation may not have been deemed necessary in some instances (eg, self-medicating, referral to a district nurse or nursing home). Determining actual numbers of patients requiring counselling was not within the scope of this audit but may provide an actual figure of adherence to Standard 4. Time of discharge may also influence the quality of safe practice. 70% of patients were discharged between 5pm and 10pm, when the reduced availability of permanent (nursing) staff and other support staff (pharmacy) may in turn reduce effective discharge. Notably no trend between time of discharge and adherence to Standards 3 and 4 could be substantiated within the scope of this audit.

Standard 5 was not completely met. Of the 29 checklists filed in medical notes only 20% were complete. Reasons for incomplete or unfiled checklists may include death, failed discharge, given to patient or recycled. The sample size was too small to draw a conclusion on the effect on patients who did have the checklist completed. This could be determined in future audits with a larger sample size.

The low level of adherence to the standards suggests a need for further training and awareness of the checklist. For the purpose of this audit the checklist was attached in pharmacy, with the intention of nursing staff taking ownership of this role. A revised checklist will be developed from checklist user feedback and re-audited in the future.

Acknowledgement: Think Glucose Steering Group, Bedford Hospital NHS Trust.

REFERENCES
UKCPA EDUCATION AND TRAINING AWARD 2011

An evaluation of the preregistration trainee pharmacist accuracy checking evidence training programme (PACE)

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The performance standards for pharmacy preregistration training require that trainees must learn to “effectively check prescriptions dispensed by others”. However, an informal review of practice, undertaken in January 2008, identified wide variation in the training programmes delivered by hospitals. A task and finish group concluded that it would be desirable to have a standardised training programme across Wales to set standards and facilitate transfer of skills between sites but the accredited checking technician (ACT) scheme did not meet the preregistration trainees’ learning needs. As a result, a new training programme was developed: PACE. PACE includes collection of an evidence log of accuracy checks that have been made for at least 1,000 items and also a checking assessment. Unlike the ACT scheme, following an error PACE requires the preregistration trainee to complete an error reflection form (incorporating a risk assessment) and agree an action plan for progress with their tutor. During PACE the preregistration trainee is second checked by a qualified accuracy checker to ensure standards of patient safety are upheld. On completion of PACE the preregistration trainee will become accredited to perform accuracy checking within Welsh hospital pharmacy departments. As a corollary, becoming accredited to accuracy check would aid their development as professionals and would provide them with an opportunity to gain greater responsibility.

AIMS AND OBJECTIVES

Aims: To standardise preregistration trainee accuracy checking training across Wales.

Objectives: to evaluate the uptake of the PACE framework within Wales; to explore the views of preregistration trainee, preregistration tutors and dispensary managers on the use of the error reflection forms and the trainees’ competence to accuracy check on completion of the programme.

METHODS

In spring 2009, following research and development office approval, two semi-structured group interviews were held: one with preregistration trainees and one with preregistration tutors and dispensary managers. These informed the development of two self-completion questionnaires. These were piloted and amendments were made. The preregistration trainee questionnaire was distributed to the 2008–09 cohort of trainees attending a residential course in May 2009. The questionnaire for preregistration trainees and dispensary managers was sent out via e-mail and hard copy across all hospital preregistration training sites in Wales. Consent to participate was sought, completion was voluntary and confidentiality of all responses was emphasised. The results were coded, entered into SPSS v16.0 and analysed. The trainee survey was repeated with the 2009–10 cohort of preregistration trainees at an equivalent time-point to the previous cohort. Responses of the 2008–09 and 2009–10 cohorts were compared using the Mann-Whitney test for ranked data (Likert scale questions) and chi-square for categorical data. Results were considered statistically significant when P<0.05.

RESULTS

A response rate of 100% was seen for the 2008–09 preregistration trainee cohort, 92% for the 2009–10 cohort and 83% for the preregistration tutors and dispensary managers. All 35 of the 2008–09 cohort and 37 out of 40 (92%) of the 2009–10 cohort had started PACE and 20 out of 35 (57%) of 2008–09 and 27 out of 37 (73%) of 2009–10 cohorts had already completed PACE at the time of the questionnaire. Thirty-one out of 35 (89%) in the 2008–09 cohort and 34 out of 37 (92%) in the 2009–10 cohort had completed one or more reflection logs.

DISCUSSION AND CONCLUSION

All hospital pharmacy departments implemented PACE in 2008–09 and used it again in 2009–10, indicating overall support for and the sustainability of the standardised programme. Following the 2008–09 survey a recommendation to start the programme earlier in the preregistration year was made; this may have contributed to the differences between the two cohorts views that they started the programme too late as in 2009–10 a greater number of students began PACE at an earlier stage. The similarity in the results between the two cohorts shows that opinions on the programme are reproducible. These results show that reflection helped the preregistration trainees identify how to improve their practice. They also clearly show completing the programme increased the trainees’ feelings of confidence and sense of responsibility, and that they felt undertaking PACE allowed them to gather evidence of their competence to accuracy check. The preregistration tutors and dispensary managers agreed that the evidence collected during PACE showed the trainees’ competence to check. The overwhelming majority of trainees, tutors and dispensary managers recommended PACE for future cohorts, indicating their support for the training programme.

REFERENCES


ORAL PRESENTATION PRIZE

A comparison of the impact that labelling and dispensing styles have on efficiency and accuracy in an NHS hospital pharmacy

N. Brinklow and R. Patel
King’s College Hospital NHS Foundation Trust, London

One of the main functions of a hospital pharmacy is the safe and efficient supply of medicines to patients. There are different methods of
labelling and dispensing prescriptions, but there is little published research to support any theories on which way is better. Two important factors need to be considered when dispensing: speed and accuracy. There is, however, an inherent tension between the two. An optimised method of dispensing could be defined as the acceptable rate at which items are dispensed without any errors. The aim of this research was to determine the optimum style of labelling and dispensing in pharmacy when dispensing discharge prescriptions (TTAs) for patients going home from a hospital.

OBJECTIVES
To record the time taken to dispense TTAs for each labelling style; to record the number of errors and error type that reach the checking stage; to gauge staff opinion for each labelling method; and to observe and record staff absence levels and volume of work to be dispensed at specific time points.

METHOD
Three dispensing styles were compared: “production” (one person generates labels and another dispenses), “own” (same person generates labels and dispenses) and “mixed” (where one person generates labels and dispenses robot items and another person dispenses everything else). Each dispensing style was undertaken by staff dispensing TTAs for two weeks in succession. The first week was to familiarise staff with the dispensing style, while the second week was for data collection. All TTAs dispensed during normal working hours (ie, Monday to Friday, 9am to 5.30pm) were included. The number of TTAs was not preprinted prescriptions for high-risk injectable products, which include anticoagulants. However, only partial compliance with the guideline was achieved. Therefore, other risk reduction measures were needed such as preprinted prescriptions for high-risk injectable products, which include unfractionated heparin.

RESULTS
The results are set out in Table 1 and Table 2. A total of 1,137 TTAs containing 4,759 items were dispensed and recorded. The spread of work and number staff working on TTAs throughout the day was found to be consistent across all styles. The number of staff absent due to annual, study or sick leave was found to average 5.2, with a higher average during “own” dispensing (“production” 4.4; “own” 6.8; “mixed” 4.6). Thirty online surveys were completed (“production” 13; “own” 10; “mixed”? ). When staff compared the current dispensing style with their normal style, a higher proportion of staff (n=6, 60%) found “own” dispensing to be “worse”. Comments included that “production” and “mixed” styles were felt to be the most accurate because of a second person’s involvement and “own” dispensing was perceived to be slowest.

DISCUSSION
Tables 1 and 2 illustrate that “own” dispensing style was the most efficient and accurate method of dispensing TTAs. “Production” was the least efficient and “mixed” was the least accurate. Our analysis found no additional contributory factors that could have influenced the results — although the relative complexity of prescriptions was not measured. The higher proportion of labelling errors was consistent with other studies in automated pharmacies. However, the overall incidence of prevented errors was found to be higher in this study than in other published research. Staff thought “production” and “mixed” styles were quicker than “own” dispensing. This might be because the labeller in “production” and “mixed” styles sees only part of the process and has not taken into consideration the time taken to complete the dispensing process. There also appeared to be an assumption that a second person’s involvement would reduce errors, because they would be spotted before being submitted for a final accuracy check. This research has illustrated that these assumptions are incorrect. This research has resulted in a change in practice for dispensing TTAs at this hospital. TTAs are now dispensed using the “own” dispensing style. This research is to be repeated for inpatient and outpatient dispensing streams.

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5 Beso A, Franklin B, Barber N. The frequency and potential causes of dispensing errors in a hospital pharmacy. Pharmacy World and Science 2005;27:182–90.

HAMELN POSTER PRIZE
Does a prescribing and monitoring pro forma improve practice with unfractionated heparin infusions?

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Pharmacy Department, Oxford Radcliffe Hospitals NHS Trust, Oxford

The National Patient Safety Agency (NPSA) highlighted 28 fatal incidents associated with the use of heparin between 1990 and 2002. At the Oxford Radcliffe Hospitals NHS Trust (ORH) comprehensive guidance and subsequent audits were completed in response to the NPSA alert for anticoagulants. However, only partial compliance with the guideline was achieved. Therefore, other risk reduction measures were needed such as preprinted prescriptions for high-risk injectable products, which include unfractionated heparin.

This audit was carried out after the introduction of the new chart, to establish whether adherence to the guideline improved, and monitor whether any new risks introduced. In parallel, the audit findings and staff feedback were used to test changes to the prescription prescribing chart using the Plan-Do-Study–Act (PDSA) approach to improvement.
OBJECTIVES

1. To determine the proportion of prescriptions that:
   (a) used the heparin infusion chart and
   (b) referenced the heparin infusion on the current drug chart (balancing measure)

2. To determine the proportion of patients who had the following (as advised in guideline):
   (a) baseline tests measured
   (b) indication for heparin infusion documented
   (c) correct loading dose prescribed or reason for omission documented
   (d) appropriate activated partial thromboplastin time (APTT) monitoring
   (e) APTT within target range (60–100 seconds) within 24 hours of commencing treatment
   (f) adverse effects while receiving heparin treatment
   (g) monitoring of platelet count
   (h) pump check chart in use to monitor infusion
   (i) prescription: (1) 25,000 units/25 ml syringe and units in full
       (ii) Units in both ml/h and units/h

A standard of 100% compliance with all part 1 and 2 objectives was set for all patients.

METHODS

A heparin infusion prescription and administration chart was approved for local testing and revision using PDSA methods in December 2009. Patients on the vascular surgery ward who were prescribed heparin infusions were identified to the auditor by the ward pharmacist. Data were collected using a piloted data collection form, drug charts, medical notes and the electronic laboratory results reporting system, over 16 weeks. Qualitative data on the user experience were also collected by informally interviewing nursing and medical staff. When a problem was identified with the prescribing and monitoring process changes were made and promoted; the effect of change was then monitored. The cyclic PDSA process continued through five cycles until no further issues were identified.

RESULTS

Data were collected for 18 patients. All patients had the heparin infusion chart in use when they were identified to the data collector; 14 of these charts were documented as in use on the patients’ main drug chart. A summary of the results for each of the part 2 objectives and whether this shows an improvement against the 2008 audit is shown in Table 1.

The outcomes of the PDSA cycles completed are presented in Table 2. It became evident when conducting the informal interviews and visiting the ward to collect data that as the process was altered the nursing and medical staff became more engaged in its development.

DISCUSSION

Overall the objectives of the audit were met. The chart improved adherence to the guideline when compared with the 2008 audit for seven standards, but 100% compliance was not achieved for all standards. Patients with APTT in range after 24 hours decreased. This may have arisen from unpredictable variation in response to heparin or the lack of requirement for an APTT measurement to be taken 24 hours after the infusion starts. Further education of staff and support from pharmacists while the heparin is prescribed may lead to further improvement and reduction of risk. Analysis was limited by the small number of patients included, but was appropriate to the method of testing chosen. The results may not be replicable on a ward where use of heparin is lower or without ward based medical staff. It is recommended that piloting with learning through PDSA cycles be used when the chart is introduced in another clinical area, and to test whether training improves compliance.

REFERENCES


HAMELN POSTER PRIZE

Converting patients from phenindione to acenocoumarol

U. Ashraf and S. Dobrzenski

Bradford Teaching Hospitals NHS Foundation Trust, Bradford

Warfarin may be poorly tolerated by some patients and hair loss is a particularly distressing side effect. As a result some patients may be switched to phenindione in the hope of reducing the severity of these side effects. However, a recent national supply shortage of phenindione meant looking for an alternative oral anticoagulant and switching to acenocoumarol treatment appeared to be the most immediately apparent option available. At the same time, there appeared to be no studies describing the dose equivalence between phenindione and acenocoumarol. With patients starting treatment with acenocoumarol for the first time, this study therefore attempted to determine a dose conversion factor between the two drugs.

OBJECTIVES

1. To titrate the patients previously taking phenindione onto a therapeutic dose of acenocoumarol
2. To determine a dose conversion factor between phenindione and acenocoumarol
3. To estimate the reliability of the dose relationship

METHOD

The study was carried out in the Bradford Teaching Hospitals NHS Foundation Trust pharmacy-led anticoagulant clinic. In the study, a record of all doses and international normalised ratio (INR) values was maintained as patients were converted from phenindione to acenocoumarol. As there was no immediately available conversion factor, the method used was to identify the normal maintenance dose of warfarin taken by the patient before they

<table>
<thead>
<tr>
<th>Table 1: Compliance with guideline parameters²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>a. Appropriate baseline tests measured</td>
</tr>
<tr>
<td>b. Indication for heparin infusion documented</td>
</tr>
<tr>
<td>c. Correct loading dose prescribed or reason for omission documented</td>
</tr>
<tr>
<td>d. Monitoring of APTT: (i) 4 hours after initiation</td>
</tr>
<tr>
<td>(ii) after rate change/24h</td>
</tr>
<tr>
<td>e. APTT within target range 60–100 seconds within 24h</td>
</tr>
<tr>
<td>f. Adverse effects while receiving heparin treatment</td>
</tr>
<tr>
<td>g. Monitoring of platelet count</td>
</tr>
<tr>
<td>h. A pump check chart in use to monitor infusion</td>
</tr>
<tr>
<td>i. Prescription: (1) 25,000 units/25 ml syringe and units in full</td>
</tr>
<tr>
<td>(ii) Units in both ml/h and units/h</td>
</tr>
<tr>
<td>Total patients</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Table 2: Summary of actions arising from PDSA cycle learning</th>
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<tbody>
<tr>
<td>Chart version</td>
</tr>
<tr>
<td>----------------</td>
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<tr>
<td>1.0</td>
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<td>1.1</td>
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<td>1.2</td>
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<tr>
<td>1.3</td>
</tr>
<tr>
<td>1.4</td>
</tr>
</tbody>
</table>
RESULTS

A total of 12 patients achieved what appeared to be a maintenance dose by the time that the study finished. From this group six were taking phenindione for atrial fibrillation, three for venous thromboembolic events, one for pulmonary hypertension, one for mechanical heart valves and one for left-ventricular thrombus. The lowest dose of phenindione that was taken was 20mg daily and the largest dose was 75mg daily with a mean daily dose of 47mg Table 1 shows the phenindione doses previously taken by the patients and then subsequent maintenance doses of acenocoumarol required for a therapeutic INR. Weekly doses are shown as some patients took different doses on different days. A linear regression analysis was carried out to determine the nature of the relationship between the two sets of doses. A strong linear correlation of $r = 0.89$ ($P < 0.001$) emerged described by the regression equation: Dose of acenocoumarol (mg) = 0.34 x dose of phenindione $-$ 1.4

If this equation is modified to discard the non-significant value of 1.4 and the assumption is made that the curve passes through the intercept (that zero mg of acenocoumarol converts to zero mg of phenindione) then the equation can be simplified to: Dose of acenocoumarol (mg) = 0.39 x the dose of phenindione (mg).

DISCUSSION

The relationship described above can be further simplified by regarding the dose of acenocoumarol as being 3% of the dose of phenindione. This study was limited as it involved only a small number of patients who were studied over a relatively brief period. Nevertheless, the data obtained showed a strong significant relationship as regards dose conversion to acenocoumarol within the phenindione dose range seen in this study.

Recently consensus guidelines have been produced by the London and South East Medicines Information Centre\(^1\) about switching from phenindione to acenocoumarol. Their opinion was that the dose of acenocoumarol should be 3% of that of phenindione. However, this group stressed that their recommendations were not research-based.

In the near future, new oral anticoagulant agents such as dabigatran and rivaroxaban may become licensed for treatment of conditions such as atrial fibrillation [not licensed for this indication at the time of writing] where phenindione is currently used as an alternative to warfarin. Clinical trials with dabigatran, for instance, have not to date revealed hair loss to be a problem and therefore the use of this drug may prove a real alternative to phenindione or acenocoumarol in the many patients who experience this distressing side effect with warfarin.

REFERENCES

ORAL COMMUNICATIONS

OC 1. Collaborative point prevalence audit of omitted antimicrobial doses in acute trusts across East and South-East England

J. E. Hough and J. S. Nicholls
East and South East England Specialist Pharmacy Services

The 2010 National Patient Safety Agency Rapid Response 009 on reducing harm from omitted and delayed medicines in hospital cites antimicrobials as core for local critical medicines lists. The Rapid Response Report also requires an annual audit and a review of and if necessary changes to be made for the supply of critical medicines.

A collaborative audit allows participants to compare local findings with a group of peers and for good practice to be shared. For the purposes of this audit antimicrobials were chosen as a marker of omitted doses in general.

OBJECTIVES

- To quantify the number of and reasons for the omission of prescribed enteral and parenteral antimicrobial doses in a 24-hour period in acute trusts across East and South East England
- To quantify the number and reasons for the omission of first doses of antimicrobials
- To quantify the number of omissions of those prescribed antimicrobial doses that were not stocked/stocked on wards

METHOD

A data collection form for ward-based pharmacy staff was piloted in volunteer trusts, which resulted in minor amendments, while trusts registered to participate in the audit. The amended data collection form and a trust wide spreadsheet with embedded formula for the local data were provided with detailed instructions for completing both. Omitted doses were considered those prescribed doses not administered by the time the next dose was due.

Ward based pharmacy staff reviewed the previous 24 hours of antimicrobial therapy and recorded details of prescribed antimicrobials and omitted doses. Prophylactic and treatment doses of enteral and parenteral therapy were included, but topical therapy was excluded. Trusts chose a 24-hour period between 23 November and 3 December 2010, avoiding the Mondays. The local audit co-ordinator transferred data onto the trust spreadsheet, which provided them with some instant results. Subsequently the trust spreadsheets were returned centrally for amalgamation and analysis.

RESULTS

17,407 patients from 45 acute trusts across East of England, London, South Central and South East Coast Health Authorities were reviewed; 5,899 (33.9%) patients were prescribed 21,390 doses of 8,748 antimicrobials; the number of doses prescribed per patient ranged from 1 to 7 with a median of 3. 56.6% (12,106/21,390) of the doses were parenteral.

1,120 of the 21,390 prescribed doses (5.2%) were omitted from 13.2% (781/5,899) patients. Between 1 and 4 doses were omitted (median 1). There were six possible reasons for omission and percentages of these are shown in Table 2. 63 (30%) of the 209 (19%) recorded as unavailable were later shown to have been available. For 29% (320/1120) of the omissions no reason was recorded (blanks) but on further investigation 67 (21%) of these doses had been given but the administration was not recorded.

82.8% of prescribed antimicrobial doses were stocked on wards and 4.4% (777/17,712) of these were omitted, while 343 (9.3%) of the 3,671 doses not stocked on wards were omitted.

3,261 first doses were prescribed; of these 313 (9.6%) were omitted. 27.9% (313/1120) of omitted doses were first doses. Intermediate care, care of the elderly and surgical admissions had the highest percentages of both omitted doses and omitted first doses, while paediatrics, critical care and maternity had the lowest rates of omission (Table 2).

DISCUSSION

The omission of critical medicines, represented in this audit by antimicrobials is a current focus of attention for acute trusts. These results identify a similar number of patients (781/5,899 = 13.2%) affected by omitted doses as reported by the NPSA (17%) and they highlight the need for participating organisations to review their processes.

Attention should be paid to those care areas with a particularly high omission rate; although a few areas contain small numbers and so should be interpreted with caution. Doses not stocked on wards were twice as likely to be omitted as ones stocked on wards; this traditional method of controlling access to high cost antimicrobials and those restricted to specific indications should be reviewed.

The results suggest that first doses are more likely to be omitted and this warrants further investigation as it may be argued that the first dose of an antimicrobial is particularly important.

REFERENCES


OC 2. Identifying work-related stress risk factors in an acute NHS trust pharmacy

M. Patel* and A. M. Conway†
•School of Pharmacy & Biomolecular Sciences, University of Brighton; †Brighton & Sussex University Hospital Trust

Approximately 38% of NHS staff absence has been accounted by stress, depression and anxiety. Stress within pharmacists is an increasing concern and appears to be one of the main reasons why pharmacists want to leave their highly skilled profession. Realistic methods need to be implemented in
order to decrease the levels of stress that pharmacists continue to face. The Health and Safety Executive has developed a validated management standards indicator tool questionnaire to identify six main risk factors of stress, which are demands, control, managers’ support, peer support, relationships, role and change. This tool is used to evaluate the well-being of NHS staff for individual trusts.

**OBJECTIVES**

The aim of this project was to perform a service-based evaluation and identify any risk factors associated with work-related stress in pharmacy staff in an acute NHS trust. The main objectives were: (i) to determine the stress level within the department, within different staffing groups and (ii) to provide a realistic set of recommendations in order to try and resolve any concerning issues.

**METHOD**

A cross-sectional survey was carried out on all pharmacy staff based within an acute NHS trust. The original HSE management standards indicator tool questionnaire was used.

Questionnaires comprised 35 questions which used a validated five-point Likert-scale and designed to measure demands, control, managers’ support, peer support, relationships, role and change. Ethics approval was granted by the university and the acute NHS trust. Demographic variables included gender, age, main hospital site, job title, primary job role and band.

The survey was posted to staffs who were asked to complete the questionnaire and return it to a centralised place to support anonymity. Data was collected over a three-week period. Exclusion criteria were staff on maternity leave, sick leave or annual leave. Data was entered into the software provided by the HSE, which allowed average values to be calculated and comparisons to be made against the national benchmark set by the HSE for each question. Average values were then categorised into the relative percentiles. Those questions that scored below the 20th percentile required urgent action.

**RESULTS**

The response rate was 93% (n=114/122). Pharmacists in general were the most stressed group within the job title category due to high job demands and lack of peer support, whereas pharmacy technicians were more stressed due to lack of control over their job and managers’ support. Average scores calculated for Band 4, Band 6 and Band 8a reflected the results obtained for pharmacists and pharmacy technicians. Band 6 Pharmacists were the most stressed group of all demographic categories, as they had the highest number of questions averaging below the 20th percentile, which was followed by the preregistration pharmacist trainees. Results obtained for change was one of the best overall and throughout the different demographic categories. In no particular demographic category were any questions related to change averaged below the 20th percentile score.

**DISCUSSION**

This was the first study that focused on occupational stressor for all pharmacy staff at this trust. An understanding of the occupational stressors experienced by members of staff provides much-needed insight into reasons why occupational well-being is so important, and how it can affect job satisfaction/motivation within the department to achieve set goals.

This study found that the departmental as a whole is mainly stressed due to high job demands. Pharmacists were generally found to be more stressed than the pharmacy technicians due to the level of responsibilities and workload. Demands and peer support were the main stressors for pharmacists, whereas control and managers’ support were the main stressors for the pharmacy technicians.

Line managers and staff need to work together to reduce the amount of stress within the workforce. Not only does it highlights good practice, but sets a good example to all departments at all acute NHS Trusts across the UK.

Future work regarding support for rotational posts is needed. It is important to help those individuals suffering from stress, and referrals to occupational health or the Health Employee Learning and Psychotherapy (HELP) should be considered if deemed necessary. Members of staff and patients may be at risk, unless stress within the department is acknowledged and resolved.

**REFERENCES**


**OC 3. Validation of a weight-based calculation confirmation chart to reduce the risk of calculation errors by nurses in paediatric analgesic regimens**

**Lydia Marsh and Gillian Cavell**

Pharmacy Department, King’s College Hospital NHS Foundation Trust, London

Calculation of drug doses is often a complex multi-step process. Children are at high risk of medication errors as doses are calculated on an individual basis according to body weight or body surface area. Such errors have resulted in fatalities. Because of the risk of serious harm from calculation errors the Department of Health and the National Patient Safety Agency have recommended that tools to simplify drug dose calculation are made available, especially for medicines use in children. The implementation of such charts in our trust has met some resistance on the basis that they will replace essential skills.

Recommendations from the investigation of an error involving a morphine infusion reported locally included the development of a dose calculation confirmation chart for the preparation of morphine infusions and other drugs used to manage the side effects associated with the use of opiates. A weight based calculation confirmation chart has been designed to be used alongside preformatted prescription charts for patient controlled analgesia (PCA) and nurse-controlled analgesia (NCA) in paediatrics. The chart was colour-coded according to the Broselow-colour coding system widely used in the management of paediatric emergencies.

**Table 1: Average scores of all respondents in regards to statements related to demands (n=114) (lower scores indicate poor performance or a potential problem area)**

<table>
<thead>
<tr>
<th>Question</th>
<th>Statement</th>
<th>Respondents’ average score</th>
<th>HSE benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Different groups at work demand things from me that are hard to combine</td>
<td>2.91</td>
<td>3.22</td>
</tr>
<tr>
<td>6</td>
<td>I have unachievable deadlines</td>
<td>3.57</td>
<td>3.64</td>
</tr>
<tr>
<td>9</td>
<td>I have to work very intensively</td>
<td>2.24</td>
<td>2.56</td>
</tr>
<tr>
<td>12</td>
<td>I have to neglect some tasks because I have too much to do</td>
<td>3.05</td>
<td>3.20</td>
</tr>
<tr>
<td>16</td>
<td>I am unable to take sufficient breaks</td>
<td>3.47</td>
<td>3.68</td>
</tr>
<tr>
<td>18</td>
<td>I am pressured to work long hours</td>
<td>3.74</td>
<td>3.94</td>
</tr>
<tr>
<td>20</td>
<td>I have to work very fast</td>
<td>2.46</td>
<td>2.87</td>
</tr>
<tr>
<td>22</td>
<td>I have unrealistic time pressures</td>
<td>3.34</td>
<td>3.58</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td>3.10</td>
<td>3.29</td>
</tr>
</tbody>
</table>
This audit aims to demonstrate that the calculation confirmation chart improves the accuracy of dose calculations compared with traditional calculation methods.

OBJECTIVES
To compare the accuracy of calculations to prepare prescribed doses of injectable medicines using mathematical skills with those obtained from a calculation confirmation chart.

METHOD
Support for the audit was obtained from the senior nurse for child health. Nurses involved in PCA/NCA administration on paediatric wards were asked to complete two written assessments. Each nurse was given a completed prescription for a patient of a given weight. Nurses were required to calculate the concentration of a morphine infusion and the volumes of naloxone for opioid toxicity and urinary retention or itching, ondansetron and cyclizine to be used to prepare injections using the prescription.

The first assessment (Assessment 1) was completed according to the individual's current practice using mathematical skills. BNFs, calculators and medicine supplies, including product information, were available for reference.

Following explanation of the purpose of the dose confirmation chart and how it should be used the same nurses completed Assessment 2 for the same prescription using the calculation confirmation chart. All Assessment papers were anonymised.

The results of the calculations from the assessments for each nurse were compared to determine the impact of the confirmation chart on the accuracy of drug doses calculated.

RESULTS
Twenty-three nurses from five paediatric wards were invited to complete the assessments. One nurse did not complete the assessment and her paper was excluded from the analysis.

Using mathematical skills (Assessment 1) 16/22 nurses gave correct answers for the morphine infusion concentration and the four volume calculations. Incorrect answers were given for two morphine concentrations, two naloxone volumes, and one cyclizine concentration. For five volume calculations doses instead of volumes were calculated. Three volume calculations were not completed by one nurse.

Using the calculation confirmation chart (Assessment 2) 22/22 nurses gave correct answers for the morphine infusion concentration and 20/22 nurses gave correct answers for all four volume calculations. As in Assessment 1, one nurse calculated doses instead of volumes. One nurse gave a dose instead of a volume for one answer (Table 1).

<table>
<thead>
<tr>
<th>Question</th>
<th>Mathematical calculation</th>
<th>Calculation confirmation chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculate the concentration of morphine sulphate in the PCA/NCA syringe in mcg/ml</td>
<td>19/22 (86%)</td>
<td>22/22 (100%)</td>
</tr>
<tr>
<td>Calculate the volume of naloxone 400mcg/ml for the prescribed dose for respiratory depression</td>
<td>18/22 (82%)</td>
<td>21/22 (95%)</td>
</tr>
<tr>
<td>Calculate the volume of cyclizine 50mg/ml for the prescribed dose for nausea and vomiting</td>
<td>19/22 (86%)</td>
<td>21/22 (95%)</td>
</tr>
<tr>
<td>Calculate the volume of naloxone 40mcg/ml for the prescribed dose for urinary retention and itching</td>
<td>19/22 (86%)</td>
<td>20/22 (91%)</td>
</tr>
<tr>
<td>Calculate the volume of ondansetron 2mg/ml for the prescribed dose for nausea and vomiting</td>
<td>20/22 (91%)</td>
<td>21/22 (95%)</td>
</tr>
<tr>
<td>Total calculations correct</td>
<td>95/110 (86%)</td>
<td>105/110 (95%)</td>
</tr>
</tbody>
</table>

Although the opinions of users of the charts were not formally tested a number gave comments about their usefulness. Positive comments included: “It’s a really good idea — very easy to use”, “It’s clear and easy to use”, “It’s too easy — I’d rather do the calculations”. Less positive comments were: “Nurses will just use the chart and will forget how to do the calculations”, “It is a bit difficult to distinguish between the lines”, “The colours are a bit confusing”.

The audit has demonstrated that accuracy of drug doses is improved by the calculation confirmation chart compared to mathematical skills of nurses working on paediatric wards. With minor modifications and a formal implementation plan including training we believe that such charts will promote the safe use of medicines. However, essential mathematical skills of staff involved in the medicines use process should be improved and maintained.

REFERENCES
3 Selvan VA, Calvert SHS, Cavell G, et al. Weight-based N-acetylcisteine dosing chart to minimise toxicity. 3

OC 4. Acute renal toxicity and its detection by the yellow card reporting scheme

K. Davidson*, S. Kerr*†, M Kinnear*‡ and D. N. Bateman§
*NS Lothian Pharmacy Service, Edinburgh; †Yellow Card Centre (YCC) Scotland, Edinburgh; ‡Strathclyde Institute of Pharmacy and Biomedical Sciences, Glasgow; §University of Edinburgh, Edinburgh

Adverse drug reactions (ADRs) are a major public health concern. They can result in prolonged hospital stay and increased costs together with significant morbidity and mortality. The yellow card (YC) scheme is a spontaneous ADR reporting scheme run by the Medicines and Healthcare products Regulatory Agency, which forms part of the UK pharmacovigilance strategy. An independent review of YC data recommended exploration of the data to improve rate and quality of YC reports to maximise public health benefit.

Acute renal toxicity secondary to medicines is a common cause of reversible acute renal failure. As management involves cessation of the suspected medicine, identification of occurrence of an ADR and the medicine involved should be relatively clear-cut. The MHRA classifies renal dysfunction as a serious ADR and therefore all occurrences should be reported on a yellow card ADR report. The aim of this study was to analyse YC data on renal ADRs to provide further information in terms of drugs implicated and reporter profile which would subsequently inform a strategy in improve reporting in this area.

OBJECTIVES
To describe frequency and profile of reporters of YC reports for renal toxicities in Scotland and the UK, and to identify which drugs are reported and at what frequency and to identify risk factors for drug induced renal toxicity.

METHOD
Approval was granted from the MHRA Independent Scientific Advisory Committee (ISAC) to access the YC database. It was confirmed that
research ethics approval was not required. Data was obtained through retrospective analysis of UK YC database from 2002 to 2006 using specified renal urinary MedDRA terms to identify relevant yellow card reports. Separate datasets of anonymised reports were provided from MHRA. Prior to analysis, data was cleaned to provide clarity of records and to standardise drug names. Data was imported to Microsoft Access for analysis. The outcome measures were frequency of drugs reported to the MHRA for UK and Scotland, identification of age, gender, co-morbidity, co-prescription drugs for three most frequently reported drug groups and reporter qualification.

RESULTS

In the UK, 1,484 (2.2%) yellow cards were received by the MHRA for the specified MedDRA terms compared to 152 (2.4%) for Scotland. The top three reported drug classes were consistent for UK and Scotland and can be seen in Table 1.

Overall, mean (SD) age was 70.62 (15.21) years and there was no difference in gender reported apart from lipid lowering agents where men were more frequently reported (66%). Data for co-prescription of other medicines and co-morbidity was limited and could not be used to comment on influence of these factors on renal ADRs.

The most frequent reporters of ADRs in the UK were hospital doctors (29.4%), hospital pharmacists (28.7%) and GPs (23.4%). In Scotland, the most frequent reporters were hospital pharmacists (35.5%), hospital doctors (29.0%) and GPs (21.7%).

DISCUSSION

Data confirms that NSAIDs and drugs affecting the renin-angiotensin system are most frequently implicated in renal ADRs. However, the finding of lipid lowering agents is unexpected. A recently published population based cohort study found statins were associated with increased risk of acute renal failure, therefore further investigation is warranted to establish additional information on this ADR and subsequent impact that labelling and dispensing styles have on efficiency and accuracy in an NHS hospital pharmacy.

OC 5. A comparison of the impact that labelling and dispensing styles have on efficiency and accuracy in an NHS hospital pharmacy

N. Brinklow and R. Patel
King’s College Hospital NHS Foundation Trust. London

Winner of oral presentation prize (see p55)

OC 6. Impact of interprofessional advanced simulation training (AST) on preregistration pharmacists: self-perception of confidence, competence and communication skills

Amanda Kemp1, Andrew Batter3 and Peter Rivers *
1Leicester School of Pharmacy, De Montfort University; †Trent Simulation and Clinical Skills Centre

The longer term benefits of interprofessional education (IPE), in terms of underpinning professional practice, remain largely unproven. This contrasts with a generally positive reaction to the IPE learner’s experience. However, there is mounting evidence that pharmacists derive value through gaining a better appreciation of how others perceive their role and in learning to challenge prejudices in order to improve teamwork. Based on established principles of safe practice, the Simulation and Clinical Skills Centre offers advanced simulation training using manikins aimed at improving clinical skills within a multidisciplinary team.

This paper presents the findings derived from a total of 14 comparable AST training events where preregistration pharmacists, junior doctors and nurses worked as a team to assess and treat a manikin patient in a variety of emergency scenarios.

AIM AND OBJECTIVES

The aim of the study was to evaluate the learning experience of preregistration pharmacists who attended one of the 14 events. The objectives were:

1. To measure, before and after the event, the level of self-belief in terms of perceived confidence, competence and ability to communicate with colleagues.

2. To gain reflective insights into the learning experience of preregistration pharmacists.

METHODS

Twenty-eight pharmacists, attending in pairs, each completed one of the 14 AST events. Each pharmacist completed a seven-point Likert-style evaluation questionnaire two weeks prior to, and immediately after, an AST event. Statements were designed to tap the self-belief of delegates.

Responses were coded from “strongly agree” to “strongly disagree”. Each response was allocated a score on a scale from 1 to 7. Examples of statements were: “I live in terror of making a mistake” — agreement with this negative statement was scored at the lower end of the scale (1, 2 or 3). By contrast, agreement with the positive statement “I feel well prepared to start work” was

<table>
<thead>
<tr>
<th>Table 1. Frequency of reported drugs (by BNF section) to MHRA for specified renal/urinary terms in UK and Scotland 2002–06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drugs implicated</td>
</tr>
<tr>
<td>Lipid lowering agents</td>
</tr>
<tr>
<td>(10 January 2001)</td>
</tr>
<tr>
<td>Drugs affecting the renin-angiotensin system</td>
</tr>
<tr>
<td>(2 May 2005)</td>
</tr>
<tr>
<td>NSAIDs</td>
</tr>
<tr>
<td>(2 December 2000)</td>
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REFERENCES


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scored at the higher end (5, 6 or 7). Using SPSS V16, mean scores were computed for each scale (CONFIDSCORE, COMPETSCORE, COMMSCORE) and a total summed score (TOTSCORE). Those with a TOTSCORE below the median prior to the event were classified as having "low self-belief" and the remainder had "high self-belief". Open text questions were also provided so delegates could comment on their learning experience.

RESULTS

Mean scores before and after the event showed only marginal changes. The mean scores (± 95% confidence intervals) were: CONFIDSCORE: Pre: 13.9 (±1.0), Post: 12.6 (±0.89), COMPETSCORE: Pre: 9.5 (± 0.84), Post: 9.6 (± 0.80), COMMSCORE: Pre: 5.4 (±0.66), Post: 5.2 (±0.62) and the combined TOTSCORE: Pre: 28.8 (±2.0), Post: 27.4 (±1.8). However, a sub-analysis showed that, for those whose self-belief was relatively low before the event, their mean TOTSCORE was raised after the event although it was not statistically significant. This contrasted with the high self-believer group for whom their mean TOTSCORE was substantially and statistically significantly reduced (Table 1).

Responses to open-text questions were crystallised into five themes:

1. Appreciation of one’s value, eg, “I now have a clearer picture of my role within the team but can also appreciate the constraints others are under”
2. Mutual understanding of each others’ professional role/knowledge or expertise, eg, “I learnt from F1 as much as I hope they learned from us”
3. Real life patient management, eg, “[I was] able to experience what it would normally be like on the wards in real life”
4. Integration/close working relations, eg, “It’s very important to face an interdisciplinary team process — the results are exponentially greater”
5. Lack of pharmacy specificity, eg, “[There were] limited things pharmacists could do in the situations we were in”

A typical comment that illustrated perceived confidence was: “Don’t go beyond what you are comfortable or competent to do and stand by it”

DISCUSSION

Interprofessional AST for preregistration pharmacists may lead to a greater or lower self-belief, depending upon the individual. A reduction in self-belief may be a positive attribute if this triggers a personal incentive to improve a clinical skill.

It was of interest that those with least self-belief before the AST event found that the event tended to boost their perceived confidence. This contrasted with those with higher initial levels of self-belief for whom the AST event provided a “reality check”. Tutors should be aware that individual learners with high self-belief may have different support needs after interprofessional advanced simulation training.

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<table>
<thead>
<tr>
<th>Table 1: Level of self-belief of pre-AST event “low self-believers” and pre-AST event “high self-believers” before and after the AST event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of pre-AST event self-belief</td>
</tr>
<tr>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Low self-believers (n=14)</td>
</tr>
<tr>
<td>High self-believers (n=14)</td>
</tr>
</tbody>
</table>

AUDIT

1. An audit of the quality of intravenous medication prescribing in adult patients at Buckinghamshire Healthcare Trust

A. Ghani and S. Khalid
Buckinghamshire Healthcare NHS Trust

Errors in the prescribing and administering of medication are common but errors in injectables are more complex and can be potentially dangerous. It has been found that incidence of error in injectables is higher than for any other medication form.

In response to this the National Patient Safety Agency issued an alert in March 2007 entitled “Promoting safer use of injectable medicines”, highlighting that injectables were an area where errors were more likely to occur so reviewing and evaluating policies was necessary to ensure the use of injectables was safer. Therefore, the aim of this audit was to investigate whether the Buckinghamshire Healthcare NHS Trust’s (BHT) injectables policy is being adhered to when intravenous medication is prescribed.

OBJECTIVES

1. To ascertain whether recommendations from a baseline audit carried in 2008 in response to the NPSA alert have been implemented.
2. To quantify the percentage of health professionals that state all mandatory information for IV prescriptions as stated in the Injectables Policy (standard 1 = 100%).
3. To quantify the percentage of health professionals that state additional technical information for intravenous prescriptions (standard 2 = 100%).
4. To determine whether supplementary prescriptions are attached to gentamicin and vancomycin prescriptions (standard 4 = 100%).
5. To quantify whether all wards have up to date copies of the Trust injectables policy and adults injectables guide (standard 3 = 100%).

METHOD

All wards were included except children’s, cancer, endoscopy, day surgery and theatres. The audit focused specifically on intravenous medication prescribing as it is the main form of injectable prescribed in the trust. All types of intravenous (IV) medication were included except for total parenteral nutrition (TPN) and patient controlled analgesia (PCA) because PCA and TPN charts have all the technical information stated on the chart so the data would have skewed the results.

The form was piloted on 10 random drug charts that had been sent down to the dispensary before the main data collection. The audit was then carried out as a point prevalence study on set days at Wycombe General Hospital and Stoke Mandeville Hospital by ward pharmacists and the investigator. Once all the data had been collected it was input and analysed on SPSS (Statistical Package for Social Sciences) to cross-tabulate the data and investigate significance of results.

RESULTS

A total of 129 patients were included in the audit with a sum of 265 intravenous prescriptions. Table 1 demonstrates compliance in relation to compliance with injectables policy and adults injectables guide.

Table 1: Mandatory information compliance

<table>
<thead>
<tr>
<th>Mandatory information</th>
<th>Compliance against 100% standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient name</td>
<td>100% (n=265)</td>
</tr>
<tr>
<td>Medication name</td>
<td>100% (n=265)</td>
</tr>
<tr>
<td>Date</td>
<td>95% (251)</td>
</tr>
<tr>
<td>Dose</td>
<td>100% (n=264)</td>
</tr>
<tr>
<td>Prescriber’s signature</td>
<td>100% (n=265)</td>
</tr>
<tr>
<td>Allergy status complete</td>
<td>97% (n=257)</td>
</tr>
<tr>
<td>Route</td>
<td>100% (n=265)</td>
</tr>
<tr>
<td>Frequency</td>
<td>98% (n=260)</td>
</tr>
</tbody>
</table>
Rivaroxaban should only be prescribed for patients in whom it is indicated.

The first dose should be prescribed for 6–10 hours post surgery on the front of the drug chart and should be administered within this time period.

The appropriate remaining course should be prescribed in the thromboprophylaxis section of the drug chart.

Other objectives were to document the use of other drugs which can affect bleeding, to document any adverse effects and thrombotic events and to provide feedback to orthopaedic surgeons and anaesthetists.

### DISCUSSION

Compliance for good practice information was poor possibly because the BHT injectables guide states reconstitution and administration information but it is still necessary for health professionals to state this information on the drug chart because one study found that one of the reasons for IV medication errors was that prescriptions were “incomplete” or “ambiguous”.

The strengths of the audit were that it was a prospective study so it demonstrated the position of the trust at a specific point of time. However, because it was point prevalence, the results of the audit only reflect the position of the trust on one day.

The audit was carried out by a variety of pharmacists so interpretation of information may have been different in turn leading to variation in the way data was collected. Furthermore, the data collected for the audit was not qualitative so it is unclear whether the good practice particulars stated on the drug chart were in actual fact correct.

As a result of this audit it has been recommended that the BHT drug charts IV section is amended to aid compliance in health professionals stating mandatory information that is required on a BHT IV prescription and Table 2 demonstrates compliance in relation to good practice information.

Overall, 89% of IV prescriptions were compliant with respect to stating mandatory information (Standard 1) and only 9% compliant with stating good practice information (Standard 2).

The trust was 100% compliant at ensuring each vancomycin and gentamicin prescription had a supplementary prescription chart attached (Standard 3), and a hard copy of the Injectables Policy and Adult Injectables Guide was available on every ward (Standard 4).

### RESULTS

Data were collected for 113 patients (43 THR, 69 TKR and three other knee surgery). Prescribing data is summarised in Table 1. Six patients were prescribed rivaroxaban inappropriately of whom three had other knee surgery and three were on warfarin preoperatively. Two of the warfarin patients were switched to enoxaparin before any rivaroxaban doses were given. Four patients were prescribed enoxaparin, of whom two were switched to rivaroxaban and the remaining two were excluded from the audit analysis.

Twenty-three patients did not receive their first dose within 6–10 hours (range 2.5–54 hours) after surgery. Six of these were due to nurse error, 16 due to prescriber error and one due to bleeding. The percentage of patients who received their first dose within 6–10 hours improved from 56% in the first quarter to 100% in the third quarter (two proportions comparison p<0.001) but worsened for the last quarter (84%) due to prescribing errors. Only 77 (68%) stat doses were prescribed on the front of the drug chart, but improved from 33% (first quarter) to 94% in the fourth quarter (two proportions comparison p<0.001). There was no significant difference between hospitals.

### Objectives

The primary objective was to find out if rivaroxaban was prescribed in accordance with the following audit standards:

- Rivaroxaban should only be prescribed for patients in whom it is indicated (ie, elective TKR and THR with no contraindications)
- The first dose should be prescribed for 6–10 hours post surgery on the front of the drug chart and should be administered within this time period.
- The appropriate remaining course should be prescribed in the thromboprophylaxis section of the drug chart.

### Table 2: Good practice information compliance

<table>
<thead>
<tr>
<th>Good practice information</th>
<th>Compliance against 100% standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diluent name and volume</td>
<td>13% (n=20)</td>
</tr>
<tr>
<td>Infusion name and volume</td>
<td>48% (n=20)</td>
</tr>
<tr>
<td>Final concentration</td>
<td>1% (n=2)</td>
</tr>
<tr>
<td>Rate</td>
<td>40% (n=3)</td>
</tr>
<tr>
<td>Duration of administration</td>
<td>4% (n=10)</td>
</tr>
</tbody>
</table>

### Table 1: Compliance with audit standards for rivaroxaban prescribing

<table>
<thead>
<tr>
<th>Audit standard</th>
<th>Number of patients for whom audit standard was met</th>
<th>Number of patients for whom audit standard was met</th>
<th>Number of patients for whom audit standard was met</th>
<th>Number of patients for whom audit standard was met</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Days 1–15</td>
<td>Days 16–30</td>
<td>Days 31–45</td>
<td>Days 46–60</td>
</tr>
<tr>
<td>Appropriate indication</td>
<td>26 (96%) 28 (97%) 24 (92%) 29 (94%) 109 (96%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First dose in 6–10 hours</td>
<td>15 (56%) 23 (79%) 26 (100%) 26 (94%) 90 (90%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First dose on front of drug chart</td>
<td>5 (17%) 19 (65%) 20 (77%) 25 (94%) 77 (68%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate course</td>
<td>4 (15%) 5 (19%) 3 (12%) 14 (45%) 23 (20%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
between the first and last quarter in prescribing rivaroxaban for an appropriate indication. The correct course length was prescribed for 16 TKR and seven THR only, with no course length specified for 84 patients. Prescribing improved during the audit following emails sent to the surgeons and anaesthetists after two and four weeks.

There were five wound events (bleeds or oozes) resulting in withholding or discontinuation of rivaroxaban, three of which occurred in patients who received their first dose less than 6 hours after surgery. One TKR haemarthrosis returned to theatre and another TKR and THR were switched to enoxaparin once haemostasis was re-established. There were two major gastrointestinal bleeds; one had their first rivaroxaban dose 2.5 hours after surgery and had taken diclofenac for years. The other was taking aspirin and mirtazapine and was transferred to intensive care.

Two patients developed pulmonary emboli, one of whom was using hormone replacement therapy, one patient died from an acute myocardial infarct and one patient developed a tachycardia (pulse>200).

### DISCUSSION
Orthopaedic surgeons have expressed concerns about bleeding risks with rivaroxaban but there have been no reports about associated prescribing errors. Our audit showed that prescribing errors with rivaroxaban were not uncommon but did improve with time. It is possible that premature administration of rivaroxaban could contribute to bleeding, and in this audit three of the five patients who had significant wound events received their first dose too soon after surgery.

Providing feedback to the doctors during the audit period raised awareness and improved prescribing. Monitoring the use of a new drug in surgical patients is essential to optimise patient safety.

### REFERENCES

### Table 1: The number and percentage of patients initiated on a statin within the Trust and compliance with the guidelines

<table>
<thead>
<tr>
<th>Statin</th>
<th>Number (%) of patients initiated on a statin by the trust</th>
<th>Number (%) of patients for whom prescribing was initially compliant</th>
<th>Number (%) of patients for whom prescribing was compliant after pharmacist intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorvastatin</td>
<td>18 (45%)</td>
<td>14 (35%)</td>
<td>17 (43%)</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>22 (55%)</td>
<td>22 (55%)</td>
<td>22 (55%)</td>
</tr>
<tr>
<td>Other statins</td>
<td>0 (0%)</td>
<td>36 (90%)</td>
<td>39 (90%)</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 2: The number and percentage of patients receiving a statin prior to admission and compliance with LHE guidelines with respect to prescribing changes by the trust

<table>
<thead>
<tr>
<th>Statin</th>
<th>Number (%) of patients receiving a statin on admission</th>
<th>Number of patients whose statin was changed by the trust</th>
<th>Number of changes compliant with the LHE guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorvastatin</td>
<td>47 (30%)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>99 (63%)</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Other statins</td>
<td>12 (7%)</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>13</td>
<td>12</td>
</tr>
</tbody>
</table>

### METHOD

#### Part 1: For a period of four weeks, prescriptions for all inpatients and outpatients for whom a statin had been initiated by the trust were audited.

Data collection was carried out by all pharmacists, using a standard data collection form which had been piloted in October 2010.

#### Part 2: For a period of one week, data was collected on any changes made to statin prescribing for patients already taking a statin prior to admission to the trust.

Data from the audit was inputted into a Microsoft Excel spreadsheet for analysis.

### RESULTS

#### Part 1: During the four-week audit period 40 patients were initiated on a statin by the trust. The initial compliance with LHE guidelines was 90% by prescribers, and this increased to 98% after interventions were made by pharmacists (see Table 1).

#### Part 2: During the one-week audit period 158 patients were admitted to the trust who were already taking a statin. Simvastatin was the most commonly prescribed statin (63%) followed by atorvastatin (30%) (see Table 2). Changes were made to the statins prescribed for 13 patients, and 12 of these changes (92%) were compliant with LHE guidelines.

### DISCUSSION

The trust met the audit standards and the CQUIN target. 90% of patients were initiated on a low-cost statin initially, which indicates a good level of knowledge of the statin guidelines among prescribers. Following intervention by pharmacists the percentage increased to 98%, demonstrating the importance of pharmacists in helping to enforce the guidelines.

A single patient remained on atorvastatin who did not meet the guideline criteria; however, this was a complex patient who had suffered a gastrointestinal bleed and was not considered medically appropriate to undergo angiography.

Part two of the audit showed the proportion of patients prescribed simvastatin on referral or admission to the trust was 63%, which is below the target of 80% set across London. At present if a patient is prescribed atorvastatin for unknown reasons the GP is prompted to review the statin in the discharge letter. As a recommendation more work could be done by the trust PCT pharmacist to educate local GPs about the statin guidelines. 92% of changes to statin prescribing for patients admitted on a statin were made in accordance with the LHE guidelines. These results are similar to a previous audit carried out in October 2010, where 99% of patients were initiated on a low cost statin unless clinically inappropriate. The trust has continued to meet the CQUIN target, and the
results will be presented to the Drugs and Therapeutics Committee (DTC). Re-education will be required for the new intake of junior doctors in August to ensure the statin guidelines continue to be followed, and training will be included in the FY1 prescribing session held by pharmacy. One limitation of the audit is the relatively short data collection period, which may not be representative of the entire year. A re-audit will be performed in one year’s time.

REFERENCES
1 Drugs & Therapeutics Committee. Statin guidelines, June 2010, North West London Hospitals Trust.

4. Reducing clinical risk: Audit of appropriateness of intravenous antimicrobial prescribing and optimal patient care delivery within a district general hospital

G. Allison, P. Hyland. L. Harrison and S. McCormick
NHS Lanarkshire (NHSL)

The duration of intravenous (IV) antimicrobial therapy is often inappropriate and this has driven development of local protocols to encourage IV to oral antimicrobial switch. One of the complications associated with prolonged IV administration is healthcare associated infection (HAI) such as *Staphylococcus aureus* bacteraemia (SAB) which have a mortality of 30%. Optimal peripheral vascular catheter (PVC) management is essential. PVC care bundles are one of the measures that have been implemented to reduce the incidence of HAI.1

The Scottish Government has introduced a number of performance targets for the NHS known as HEAT targets. One target is to reduce the number of SABs as part of the plans to reduce healthcare associated infections. The HEAT target was a reduction in SABs (including MRSA) cases by 30% by 31 March 2010 and to achieve a further reduction in cases of 15% by 31 March 2011.

The aim of this audit was to determine the quality of IV antimicrobial prescribing in relation to NHSL IV to Oral Switch Protocol for Adults (IVOST policy) and whether optimal care was being delivered to patients to minimise HAI risk.

OBJECTIVES
- To identify whether patients receiving IV antimicrobials were prescribed IV antimicrobials in accordance with the criteria for IV administration detailed in the NHSL IVOST policy.
- To determine whether patients on IV antimicrobials had PVC care bundles in place. The standards set for this audit are as follows: 100% of patients on IV antimicrobials should be compliant with the NHSL IVOST policy; 100% of patients on IV antimicrobials should have a PVC care bundle completed.

METHOD
Data for this audit was collected as part of a larger point prevalence study (PPS) on antimicrobial prescribing which was conducted on 13 January 2011 at Hairmyres Hospital. All patients who were 16 years and over and receiving systemic antimicrobial therapy were eligible for inclusion. 493 inpatient beds were audited to collect data on antimicrobial regime prescribed, site of infection, route of administration, whether sepsis criteria had been present in the previous 24 hours and on PVC care bundle criteria.

RESULTS
Of the 147 patients on antimicrobial therapy, 63 patients (43%) were identified as receiving IV antimicrobials (Figure 1). Fifty-six patients (89%) on IV antimicrobials had one or more of the NHSL IVOST protocol indications for prescribing IV antimicrobial therapy. This does not meet the standard required of 100% of patients on IV antimicrobials to be compliant with the NHSL IVOST policy. Thirty patients (48%) on IV antimicrobials had PVC care bundles in place on the day of the PPS. This does not meet the standard required of 100% of patients on IV antimicrobials having a PVC care bundle completed.

DISCUSSION
This audit has identified areas of clinical practice that are non compliant with local policy. Seven of the 61 patients on IV antimicrobials did not comply with the indications for IV administration listed in the NHSL IVOST protocol. These patients should have been eligible for oral administration of antimicrobial therapy. Six of the seven cases eligible for IV to oral switch were on surgical wards. Targeted feedback to surgical wards should be an immediate priority. Thirty-three of the 63 patients on IV antimicrobials did not have a PVC care bundle completed. That over half the patients on IV antimicrobials were not receiving optimal patient care is concerning and provides a clear target for improvement. Tailored improvement education and positive enforcement strategies to overcome “care bundle fatigue” may be required. Optimising PVC care and IV prescribing will help NHSL achieve the HEAT target for reducing SABs. As the data presented in this audit was collected via a PPS it is important to note that the appropriateness of IV prescribing can only be established for the day of the audit and cannot be extracted to overall practice.

RECOMMENDATIONS
1 Timely feedback of audit results to the local multidisciplinary teams in particular surgical areas (ie, all prescribing, nursing and pharmacy frontline clinical staff) with specific education reinforcing the criteria relating to appropriate IV antimicrobial prescribing and implications for quality of patient care being delivered.
2 Support for improvement should be sought from key stakeholders throughout the organisation, eg, Scottish Patient Safety Programme, Infection Control and Antimicrobial Management Team Leads to work with front line staff to bring about sustainable improvement using validated tools and methodology.
3 Practical reinforcing measures to stimulate prescriber IVOST review and...
care bundle completion should be explored with front line staff e.g. laminated versions of the NHSL IVOST protocol within patient bedside folders or development of an IVOST care bundle which prescribers would complete during daily review.

4 Re-audit post intervention to ensure improved clinical performance, improved patient care delivery and contribute to NHSL SAB 2011 HEAT target achievement.

REFERENCES

5. The appropriateness of prescribing of intravenous and oral paracetamol to hospital inpatients

A. R. Hamilton and G. Cavell
Pharmacy Department, King’s College Hospital NHS Foundation Trust

Recently the tragic fatality of a young woman following a prescribed overdose of intravenous (IV) paracetamol has been described.1 The 19-year-old’s weight of 35kg was not taken into account when the prescription was written and she was prescribed 1,000mg, an error that was overlooked by others involved in her care and which resulted in fatal liver damage. The product licence for intravenous paracetamol recommends that patients weighing less than 50kg should receive a dose of 15mg/kg, equivalent to 525mg in this case.2

Paracetamol is often prescribed “multiroute”, allowing the nurse administering the dose to decide whether to use the oral or IV route depending on the patient’s clinical status. This may not be appropriate for paracetamol where the licensed doses differ.

Oral paracetamol is at least 90% bioavailable. Doses of 75–150mg/kg/24hours can cause severe hepatic necrosis, especially in patients at high risk.3 Patients routinely prescribed doses of 1000mg paracetamol four times a day may be at risk of toxicity, especially if they are at high risk of liver damage due to concurrent use of enzyme inducing drugs or malnutrition.

Between April and December 2010, 34,000 infusions of IV paracetamol were supplied by our pharmacy department; 97% of vials issued to adult wards were 1g vials. The aim of this audit was to establish whether paracetamol doses prescribed for adult inpatients are appropriate with regards to body weight.

OBJECTIVES
To determine the appropriateness of paracetamol doses prescribed for adult inpatients.

Audit standards: body weight is documented for 100% patients prescribed paracetamol; prescribed doses are appropriate for body weight (100%).

METHOD
Pharmacy issue data was used to determine the wards using the highest numbers of paracetamol infusions. Critical care, surgery and hepatology wards were visited once during the two-week audit period. Prescriptions for all patients on these wards were screened for prescriptions for paracetamol. The following information was recorded for each patient: patient initials, age, weight, e-GFR, dose of paracetamol, dosing frequency, route(s) of administration. Where the weight was not documented this was estimated by the investigator. For each patient the expected paracetamol dose and frequency were calculated and compared to the prescribed dose and frequency. The dose in mg/kg and the dose in mg/kg/day were calculated. The number of days of treatment was also recorded.

RESULTS
The results are summarised in Table 1.

Sixty-three adult patients (34 male, 29 female) prescribed paracetamol were identified and included in the audit. Weights were not documented for 10 patients (16%, 16%). Two patients had documented weights of under 50kg (41kg, 49kg). Fifteen patients were prescribed oral paracetamol only, and 48 patients were prescribed paracetamol “multiroute” (IV/PO). Sixty-one patients were prescribed only 1,000mg doses. Two patients (41kg, 62kg) were prescribed total daily doses exceeding 1,000mg. IV doses were prescribed to be given three times a day (TDS) to these two patients. All other patients (61/63) were prescribed four times a day (QDS) doses.

Twenty-nine patients were prescribed doses greater than 15mg/kg. Twenty-one of these were prescribed IV paracetamol. Three patients (41kg, 49kg, 50kg) were prescribed doses of 20mg/kg or more, two of whom were prescribed IV paracetamol. Eight patients were prescribed total daily doses greater than 75mg/kg (range 75–97.6mg/kg). No patients were prescribed doses greater than 100mg/kg.

DISCUSSION
The British National Formulary states that paracetamol toxicity can occur at doses of 75mg/kg (approximately 10 tablets [5g] in a 70kg patient), which equates to 18.75mg/kg/dose. This audit found that routine prescription of 1,000mg of paracetamol which could be administered orally or intravenously four times a day exceeded the safe dose in eight of the 63 adult patients (12.7%). Only two of these patients weighed less than 50kg. Six patients weighed 50–55kg and four of these patients were more than 80 years old. This suggests that acceptance of standard doses of 1g of paracetamol may be putting patients at risk of paracetamol toxicity especially if they are receiving doses of 4g a day regularly.

In view of the need for weight-based dosing for an increasing range of commonly prescribed drugs, patients’ body weight should be routinely documented on admission. Prescribers should be made aware of the need to adjust paracetamol doses in patients with low body weight and to review prescriptions for regular dosing frequency. Pharmacists should be made aware of the need to assess patients routinely prescribed paracetamol to ensure that safe doses are not exceeded and the risk of toxicity is minimised.

REFERENCES
3 British National Formulary 61. March 2011

6. Does a prescribing and monitoring proforma improve practice with unfractionated heparin infusions?

Weston JD and Crowley CY
Pharmacy Department, Oxford Radcliffe Hospitals NHS Trust, Oxford

Winner of Hameln poster prize (see p56)

M. France and K. Parsons K (supervised by Dr G. M. Hawkesworth) University of Huddersfield, Huddersfield

The current White Paper “Equity and excellence: liberating the NHS” states that the NHS has an obligation to cut waste in the public sector and improve its productivity.1 This obligation has instigated a renewed interest in researching into how to reduce medicines wastage. November 2010 saw the release of an in-depth review about the scale and cost of medicines wastage,2 which revised the estimated value of medicines currently wasted annually from £100m to £300m.

Considerable effort has already been made (successfully) to reduce medicines wastage using services such as the repeat dispensing scheme3 and the First Prescription Service.4

The reduction in medicines wastage is an indirect consequence of these services, so does not actively aim to reduce medicines wastage.

InterCare is the only registered drug-recycling charity (RDRC) in the UK that can accept donations of unwanted medicines from both the public and registered GP practices. It only accepts medicines that meet criteria developed from the World Health Organization, so no sharps, fridge lines or Controlled Drugs are accepted. Medicines must be in full original packs with a minimum of 15 months to expiry.

According to the most recent Code of Ethics, pharmacists are prohibited from reusing or recycling PRMs, and they must send them for incineration. This is not openly advertised to the public, yet the Government’s website (direct.gov) freely states that unwanted medicines can be donated to InterCare, as well as stating that medicines can also be returned to community pharmacies.5

OBJECTIVES

■ To contact every community pharmacy in the Kirklees & Calderdale PCTs to obtain permission to send out a questionnaire inviting community pharmacists to give their opinion on medicines wastage and whether changes to current practice were needed
■ To collate and evaluate the responses from pharmacists about their views on medicines wastage taking into account their gender, years in practice and place of work (multiple/independent)

METHOD

The questionnaire was piloted on academic pharmacists from the University of Huddersfield. After consultation, various modifications were made. The final questionnaire had 13 questions and was posted to 94 consenting community pharmacies in the Calderdale and Kirklees primary care trusts; 34 responses (21 males) were received. Due to the sensitive nature of topic investigated, the questionnaires were anonymous. Pearson’s Chi Square analysis was carried out on relevant questions to identify the possible effects of gender, years of practice, whether the participant was a regular or locum pharmacist and whether the pharmacist worked in a multiple or independent pharmacy.

RESULTS

85% of participants were not aware of the existence of RDRCs. Despite this, 65% of participants believed these charities are a suitable option for reusing patient-returned medicines (PRMs) over the current option of incineration or alternatively redispersing the returned medicine. 94% of participants were unaware that the GMC does not prevent GP practices from accepting PRMs and donating them to RDRCs.

Pharmacists, when asked, felt they had the professional judgement to decide if something was suitable for reuse or donation to RDRCs. The majority of participants (82%) would be happy to participate in a drug donation scheme based in community pharmacies, with the same percentage (82%) of respondents agreeing that pharmacy support staff could process the returned medicines. Pharmacists felt they had some degree of responsibility for people not directly under their care. 60% of participants believed that the General Pharmaceutical Council should review the Code of Ethics with regards to the processing patient-returned medicines.

DISCUSSION

The majority of pharmacists surveyed would like to see PRMs (which meet donation guidelines) to be donated to RDRCs like InterCare. Participants were concerned about the stability, storage conditions and documentation accompanying the donation of PRMs. These concerns can be alleviated with further explanation, as the stability of medicines is thoroughly tested before the product reaches the market, so medicines are stable in extreme temperatures and humidities, and any instability would, in most cases, be noticeable from the packaging (e.g., fading).

Statistical analysis was carried out on all multiple choice questions included in the questionnaire, and focused on the possible effects of gender, years of practice, place of work (multiple or independent). Surprisingly, for Question 5, a significant effect of gender on a participants’ response was found (Pearson Chi Square Value = 4.51, p < 0.05). This may be because females are often thought to be more empathic, whereas males consider things more systematically. This theory was proposed by Baron-Cohen6 and known as the empathising–systemising theory. If this theory was to be applied to participants’ answers, it can be suggested that males think of the logistics of the SOP before the people who can benefit from the proposed scheme, which is what females consider first.

Participants believed that the General Pharmaceutical Council should review the Code of Ethics with regards to drug donations. The NHS must reduce wastage, and as 50% of medicines wastage is unavoidable, ways to reuse unwanted medicines would directly save the NHS money, by reducing incineration costs, and also benefit the less fortunate who would otherwise go without treatment. Registered drug-recycling charities, like InterCare, should seek support from the RPS and enter into further discussions with the GPhC regarding drug recycling.

REFERENCES


8. De-escalation of broad-spectrum antimicrobials in a UK teaching hospital

D. Parker and K. Hand
Pharmacy Department, Southampton University Hospitals NHS Trust, Southampton

Prescribing of broad-spectrum antimicrobials (BSAMs) has increased in UK hospitals in recent years.1 BSAMs have a profound impact upon colonising resistance by eliminating commensal flora. Prompt de-escalation to narrow-spectrum antimicrobials (NSAMs), according to microscopy, culture and sensitivity (MCS) results, is therefore imperative for the majority of patients for whom BSAMs are no longer indicated. Randomised, controlled trial data are lacking but at least one observational clinical study suggested that de-escalation of BSAMs for nosocomial pneumonia is safe and effective.1
OBJECTIVES

The purpose of this audit was to evaluate adherence to hospital policy (see Table 1) for appropriate documentation of BSAM prescriptions, microbiological investigation and de-escalation of BSAMs to NSAMs. A second objective was to explore the impact of de-escalation upon clinical outcomes.

METHOD

Adult inpatients prescribed BSAMs during a two-week period in a 1,100-bed UK teaching hospital were identified from the hospital pharmacy system. BSAMs were defined as piperacillin-tazobactam, carbapenems, amphotericin injection, echinocandins, posaconazole and voriconazole. Patients with cytis fibrosis were excluded. Details of drug treatment, pathology results and medical case notes were collected from standard hospital information sources. Proportions were compared using the Chi-square statistic or Fisher’s exact test.

RESULTS

Thirty eligible patients from nine medical and surgical specialties prescribed BSAMs were selected at random for inclusion in the study (due to time constraints). The mean age of study patients was 70 years (range 24–90) and 20 of the 30 were male. Forty prescriptions for BSAMs were recorded for the 30 patients: piperacillin-tazobactam (27); meropenem (7); ertapenem (3); caspofungin (2); and amphotericin (1).

Adherence to audit standards is summarised in Table 1. Documentation demonstrated room for improvement but specimens for microbiological investigation were sent for 90% of patients. However, for 10 patients with a NSAM option available, only four were de-escalated.

Clinical outcomes are summarised in Table 2. Over all 9/30 (30%) of patients were de-escalated (five empirically). 6/21 (29%) of patients who were not de-escalated were eligible for de-escalation. Continuing broad-spectrum therapy was associated with a trend towards longer inpatient stays (49 days cf 26 days) and increased in-hospital mortality. However, these results were not statistically significant (p=0.19 and p=0.28 respectively).

Five patients (3/21 in BSAM-continued group, 2/9 in de-escalation group) subsequently became colonised with a new antibiotic-resistant pathogen during the six months after the audit, including a Pseudomonas aeruginosa resistant to piperacillin-tazobactam and a multiresistant Enterobacter cloaceae. Failure to de-escalate did not appear to be associated with an increased risk of subsequent colonisation or infection with resistant pathogens in this small sample of patients.

DISCUSSION

Documentation of prescribing and de-escalation of BSAMs in this UK teaching hospital was sub-optimal. Possible explanations include poor implementation of hospital policy and lack of confidence amongst prescribers to de-escalate. These findings serve to illustrate the importance of avoiding indiscriminate empirical prescribing of BSAMs from the outset. De-escalation was not found to be detrimental to patient outcomes in this small audit. However, patients continued on BSAMs may have been more severely unwell and a randomised controlled trial of de-escalation is required for robust comparison of outcomes.

REFERENCES


9. An audit on the use of intravesical chemotherapy following trans-urethral resection of bladder tumours at the Norfolk and Norwich University Hospital

L. Smyth, H. Dillon and C. Heywood
Norfolk and Norwich University Hospital

In the UK, bladder cancer is the fourth most common cancer in men and 12th most common in women. In 2007, 10,091 new cases of bladder cancer were diagnosed in the UK. Approximately 90% of bladder cancers are transitional cell carcinomas (TCC), the recommended treatment for which is a trans-urethral resection of the bladder tumour (TURBT) followed by one, single installation of intravesical chemotherapy. Intravesical chemotherapy following a TURBT reduces the rate of recurrence by 12% and the odds of recurrence by 39% for both single and multiple tumours for up to two years.

The relative risk of recurrence increases twofold if the chemotherapy is not given within 24 hours of TURBT. Additionally, research conducted by the European Organisation for Research and Treatment of Cancer (EORTC) has found administration within six hours reduces this risk even further.

At the Norfolk and Norwich University Hospital, mitomycin c (MMC) has traditionally been used for TCC. The administration of MMC is governed by an in-house policy. MMC is ordered by the ward, made aseptically in pharmacy and collected by ward staff. Out of hours, the urology ward use a Mitro-In device to prepare MMC on the ward to ensure patients receive their MMC in a timely manner. It has a 24-hour expiry. The most common contraindications to therapy are haematuria, previous intravesical chemotherapy and muscle invasive disease.

OBJECTIVES

To ascertain the level of adherence in patients with TCC of the bladder to:

- European guidelines for administration of intravesical chemotherapy post TURBT.2,3

---

Table 1. Adherence to audit standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>Target</th>
<th>Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Document details of BSAM in medical notes on day of prescribing</td>
<td>100%</td>
<td>83% (25/30)</td>
</tr>
<tr>
<td>2. Document indication or provisional diagnosis for BSAM in medical notes on day of prescribing</td>
<td>100%</td>
<td>80% (24/30)</td>
</tr>
<tr>
<td>3. Send specimens for MC&amp;S before starting BSAM</td>
<td>90%*</td>
<td>90% (27/30)</td>
</tr>
<tr>
<td>4. De-escalate promptly to NSAM when sensitive organism isolated and no contra-indication to NSAM agent</td>
<td>100%</td>
<td>40% (4/10)</td>
</tr>
</tbody>
</table>

*Target agreed locally as not always possible to send specimen.

Table 2. Clinical outcomes according to de-escalation of antimicrobial treatment

<table>
<thead>
<tr>
<th>Antimicrobial treatment</th>
<th>Rationale</th>
<th>Potential for de-escalation</th>
<th>Total antibiotic treatment duration mean (range)</th>
<th>In-hospital mortality (crude)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSAM not de-escalated (n=22)</td>
<td>Pathogen not sensitive to NSAM</td>
<td>No</td>
<td>19.0 days (8-33)</td>
<td>0/5</td>
</tr>
<tr>
<td>B (n=3)</td>
<td>No specimen for MC&amp;S</td>
<td>Unknown</td>
<td>13.0 days (7-15)</td>
<td>1/3</td>
</tr>
<tr>
<td>C (n=7)</td>
<td>Culture-negative</td>
<td>Unknown</td>
<td>12.7 days (7-27)</td>
<td>2/7</td>
</tr>
<tr>
<td>D (n=1)</td>
<td>NSAM option not reported by laboratory</td>
<td>Yes</td>
<td>8 days</td>
<td>0/1</td>
</tr>
<tr>
<td>E (n=5)</td>
<td>Despite NSAM option available</td>
<td>Yes</td>
<td>9.4 days (5-19)</td>
<td>1/5</td>
</tr>
<tr>
<td>Total not de-escalated</td>
<td>—</td>
<td>6/21 (29%)</td>
<td>12.4 days (3-33)</td>
<td>4/21 (19%)</td>
</tr>
<tr>
<td>BSAM de-escalated (n=9)</td>
<td>According to MC&amp;S</td>
<td>Yes</td>
<td>13.1 days (6-23)</td>
<td>0/4</td>
</tr>
<tr>
<td>F (n=4)</td>
<td>Empirical — culture-negative</td>
<td>Unknown</td>
<td>3.8 days (3-31)</td>
<td>0/4</td>
</tr>
<tr>
<td>G (n=4)</td>
<td>Empirical — pathogen not sensitive to NSAM</td>
<td>No</td>
<td>14 days</td>
<td>0/1*</td>
</tr>
<tr>
<td>H (n=1)</td>
<td>Unknown</td>
<td>—</td>
<td>13.0 days (3-31)</td>
<td>0/0</td>
</tr>
<tr>
<td>Total de-escalated</td>
<td>—</td>
<td>4/9 (44%)</td>
<td>13.0 days (3-31)</td>
<td>0/0</td>
</tr>
</tbody>
</table>
Table 1: Adherence to standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients who appropriately received MMC</td>
<td>21 (100%)</td>
</tr>
<tr>
<td>Number of patients who received MMC within 24 hours of surgery</td>
<td>18 (85.7%)</td>
</tr>
<tr>
<td>Number of patients that received MMC within 5 hours of surgery</td>
<td>1 (4.8%)</td>
</tr>
<tr>
<td>Number of prescriptions with an infusion start at stop time recorded</td>
<td>19 (90.5%)</td>
</tr>
<tr>
<td>Number of prescriptions signed by 2 nurses</td>
<td>19 (90.5%)</td>
</tr>
</tbody>
</table>

STANDARDS

The audit monitored adherence to the following standards:

1. 100% of patients undergoing a TURBT receive MMC, unless contraindicated.
2. 100% of patients post TURBT receive MMC within 6 hours (excluding patients with rosé urine), and 100% within 24 hours (all patients).
3. 100% of MMC administrations adhere to local policy: an infusion start / stop time recorded and administration signed by two nurses.

RESULTS

Fifty-six patients were identified as having TURBTs within the time period. Details were obtained from 52 patients, the remaining 4 notes being unavailable. There were 33 TURBTs in December and 19 in January. The mean age was 73 years and 69% (95% CI ± 12.5) were male. The adherence of the results to the standards for is demonstrated in Table 1.

In total, 40% (95% CI ± 28.8) of patients received MMC. The remaining 60% (95% CI ± 13.3) had contraindications meaning 100% of eligible patients received MMC.

85% (95% CI ± 11.9) of patients received MMC within 24 hours. The mean time between end of surgery and start of MMC infusion was 16 hours 30 minutes (range: 3 hours 55 minutes to 29 hours 18 minutes). Only one patient received MMC within 6 hours, 4.8% (95% CI ± 7.3). MMC was prepared on the ward once in December and once in January.

LIMITATIONS

- Convenience sampling due to time constraints, which led to a small sample size.
- MMC was only prepared on the ward twice, so it was not possible to determine its impact on preventing delays to treatment.

DISCUSSION

Although all suitable patients received MMC (100% compliance with audit standard), the timing was not optimal. The delays in receiving treatment were due to waiting for the urine to run clear or waiting for the MMC from pharmacy. The introduction of the Mitoo-In device on the ward should have prevented the delays from pharmacy, but there is a lack of nurses trained in its use due to staffing issues. Only through allocating resources for near patient manufacture on the ward by training more nurses, could the number of patients who receive MMC within six hours increase.

Recomm endations following the audit would be to implement a written protocol for the administration of intravesical MMC to standardise practice and documentation, as currently there is no written protocol. Another option would be changing to another chemotherapy agent with better stability. This would remove the delays in ordering and preparation, as well as incurring potential cost savings. A re-audit of the standards after the production of a written protocol, following training of more nurses in the Mitoo-In device and, if appropriate, the change to another agent should be undertaken.

REFERENCES


10. An audit of prescribing errors in neonates, infants and children

M. O’Meara, P. Sydney and R. and R. Onatade
King’s College Hospital NHS Foundation Trust, London

Children and young people have different healthcare needs to those of adults. Data reported to the National Reporting and Learning System highlighted that medication incidents accounted for 17% of the most commonly reported patient safety issues in children and 15% in neonates. Factors contributing to dosing errors in paediatrics include complexity of dose calculation and use of unlicensed medicines or medicines used outside the product licence.

Locally, prescribing errors are reported voluntarily online using the Datix system. However the actual rate of prescribing errors in neonates and children is unknown. The aim of this audit is to investigate the incidence and nature of prescribing errors in neonates and children in an acute teaching hospital encompassing national, tertiary and local paediatric services.

OBJECTIVES

1. To determine the number and rate of prescribing errors for hospital in-patients in neonatal and paediatric wards and to compare the findings between different specialities
2. To describe the common types of errors in paediatric prescribing
3. To list drugs most commonly associated with prescribing errors
4. To recommend strategies to improve the quality and safety of prescribing for children

METHOD

Audit standard: 0% of prescriptions contain a prescribing error

Data on prescribing errors were collected prospectively over a two-week period on six paediatric wards and one neonatal unit by pharmacists while reviewing inpatient drug charts. A published definition of a paediatric prescribing error, modified with the child health multidisciplinary team, was used to generate a data collection form. The form was piloted and minor amendments made. Prescribing errors were further categorised using a validated list of paediatric prescribing error scenarios. Data were analysed using Microsoft Excel.

RESULTS

Over the study period 1,278 new prescriptions were written and 453 prescriptions were transcribed. The audit standard of 100% error-free prescriptions was not met. Sixty-one prescribing errors were identified by...
pharmacists: six were transcription errors. An overall prescribing error rate of 4.3% (55/1278) and transcription error rate of 1.3% (6/643) were observed. Prescribing error rates varied between wards (Table 1). Four categories of prescribing error accounted for 62.1% of all errors identified (Table 2). Drugs most commonly associated with prescribing errors were colecalciferol (9.8%, 6/61), gentamicin (8.2%, 5/61), paracetamol (6.6%, 4/61), ranitidine (6.6%, 4/61) and methylprednisolone (6.6%, 4/61).

**DISCUSSION**

A similar audit from previous research reported an error rate of 13.2% across five London hospitals. Our notably lower error rate of 4.3% may have been influenced by factors such as differential detection of errors by pharmacists, a greater number of protocols and guidelines available, the level of experience of prescribers, an increased pharmacist presence on the ward at the point of prescribing or prescriber awareness that the audit was taking place.

The prescribing error rates varied between different specialities. The highest error rates were observed in critical care areas, paediatric intensive care (6.4%) and a high dependency ward (8.6%). Variied specialities and increased complexity of patients and medicines are likely contributory factors. Dosing errors accounted for 25% of the total reported errors. The highest percentage of medication errors were reported in children under the age of four (67%). These findings are similar to those reported previously by the National Patient Safety Agency. Medicines prescribed via the intravenous route. 48% of errors occurred in patients admitted to the ward for two days or less.

The results can be used to target the specific drugs and categories associated with the highest error rate, thus ensuring that there are sufficient protocols and training in place to minimise risk in the future. Dosing errors with the highest rate of occurrence may be minimised by the use of computerised systems suggesting drug doses and frequencies. Only four errors were reported on Datix, therefore an increased awareness of this reporting system is required. Limitations include: data collection was over a two-week period only, excluding weekends, in a busy hospital with a high turnover rate and thus may not be an accurate reflection of the true error rate; doctors were coming to the end of rotation at the time of audit. Further work is indicated to evaluate the clinical significance of the errors. It would be recommended to re-audit on a regular basis at different points in the prescriber training.

### Table 1: Prescribing error rates across one neonatal ward and six paediatric wards

<table>
<thead>
<tr>
<th>Ward type</th>
<th>Percentage error rate</th>
<th>Number of errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive care unit</td>
<td>6.4</td>
<td>9/140</td>
</tr>
<tr>
<td>High dependency unit</td>
<td>8.6</td>
<td>11/128</td>
</tr>
<tr>
<td>Neonatal unit</td>
<td>4.5</td>
<td>11/242</td>
</tr>
<tr>
<td>Liver unit</td>
<td>4.3</td>
<td>13/300</td>
</tr>
<tr>
<td>General paediatric ward</td>
<td>2.8</td>
<td>8/290</td>
</tr>
<tr>
<td>Surgical ward</td>
<td>1.1</td>
<td>1/89</td>
</tr>
<tr>
<td>Neurology/neurosurgery ward</td>
<td>2.2</td>
<td>2/90</td>
</tr>
</tbody>
</table>

### Table 2: Most common category of prescribing errors (n=61)

<table>
<thead>
<tr>
<th>Category of error</th>
<th>Number of errors (%)</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescribing a dose regimen not recommended for formulation prescribed</td>
<td>15 (24.6%)</td>
<td>Same dose paracetamol for oral/IV prescribed for patients less than 10kg</td>
</tr>
<tr>
<td>Unintentionally not prescribing a drug for a clinical condition for which medication is indicated</td>
<td>9 (14.8%)</td>
<td>Methylprednisolone not prescribed for a post-transplant patient</td>
</tr>
<tr>
<td>Writing a drug’s name using abbreviations or other non-standard nomenclature</td>
<td>8 (13.1%)</td>
<td>Vitamin D prescribed instead of colecalciferol</td>
</tr>
<tr>
<td>Writing an ambiguous medication order</td>
<td>6 (9.8%)</td>
<td>Formulation of tacrolimus not specified</td>
</tr>
</tbody>
</table>

### REFERENCES


### 11. Warfarin treatment: are we making it safer for our patients?

**A. Taylor, S. Smith and P. Bevan**

Wirral University Teaching Hospital NHS Foundation Trust

As part of the response to the National Patient Safety Agency (NPSA) alert "Actions that can make anticoagulant therapy safer", Wirral University Teaching Hospital Foundation Trust (WUTH) updated its “Adult oral anticoagulation” prescribing, monitoring and administration chart to aid the safe and efficacious provision of anticoagulation therapy. The chart highlights a list of risk factors that necessitate a reduced loading dose in some instances and includes details of three loading dose algorithms — standard (algorithm A), reduced dose for patients with risk factors present (algorithm B) and a low intensity regime for stroke prevention in patients with chronic atrial fibrillation (algorithm C). A maintenance algorithm (algorithm D) is also included for established patients to guide clinicians on how to adjust the dose according to their INR as a percentage of their current dose and also indicates when the next INR reading should be taken.

All charts require the recording of a patient’s demographic details (eg, name, date of birth, etc) and warfarin therapy details (eg, indication, target INR and duration of treatment). The chart must then be signed by the prescriber and, following verification, by the pharmacist. Upon discharge there is a section to be completed in line with NPSA requirements confirming that the patient has received warfarin counselling, an appointment has been made for a follow-up INR test and the required warfarin dosage has been documented in the patient’s oral anticoagulant therapy record book.

**OBJECTIVES**

- To determine if patient and warfarin therapy details are recorded and signed by the prescriber and pharmacist
- To determine if risk factors are being recorded for patients being initiated on warfarin
- To determine if the correct loading dose algorithm has been selected
- To determine if both loading and maintenance algorithms are being followed correctly
- To establish the number of patients who have a completed discharge section

**METHOD**

Data collection occurred over five working days in February 2011. All patients prescribed warfarin were identified in an e-mail notification system set up via the electronic prescribing system. All highlighted anticoagulant charts were analysed using a pre-piloted data collection sheet. Upon discharge, the charts were re-analysed to determine whether the discharge section had been completed.

**RESULTS**

In total 58 patients were identified using the electronic prescribing system. Three patients were excluded due to not having an anticoagulation chart and three had their oral anticoagulant stopped on admission due to raised INR, so 52 patients were included in the audit. Sixteen patients were newly initiated on warfarin and 36 were already established prior to admission. Figure 1 summarises the documentation of patient and warfarin therapy details recorded on each chart. Warfarin details were signed on 39 (75%) charts by prescribers and on 10 (19%) charts by pharmacists.

Six (37%) of the newly initiated patients had their risk factors recorded. The medical notes of those patients without risk factors recorded were
12. Antibiotic surgical prophylaxis: are we getting it right?

L. Williams, C. Sluman and D. Turley
Wirral University Teaching Hospital NHS Foundation Trust

Healthcare associated infections affect 8% of hospitalised patients in the UK each year, 14% of these are due to surgical site infections (SSIs). SSIs affect up to 5% of patients undergoing an invasive surgical procedure and are associated with considerable morbidity and mortality. It is estimated that they increase the cost of treatment by £3,246 per patient, and extend hospital stay by 6.5 days.

Antibiotic prophylaxis has been effectively used since 1969 for the prevention of SSIs. It involves the administration of a single dose of intravenous (IV) antibiotics at the point of induction to cover the likely infective organisms. Wirral University Teaching Hospital NHS Foundation Trust (WUTH) has produced guidelines for prophylactic surgical antibiotics.

OBJECTIVES

To determine:
- If patients undergoing surgical procedures are prescribed the appropriate antibiotic according to the guidelines
- If a second dose of prophylactic antibiotic is administered if the procedure exceeds four hours
- If a second dose of prophylactic antibiotic is administered if there is >1500ml blood loss (unless antibiotic is gentamicin)
- Reasons for non-compliance with the antibiotic guidelines

METHOD

Data were collected over one week in January 2011. Each morning the recovery room list from the previous day was consulted to identify all patients who had undergone surgery at the Arrowe Park site. The electronic prescribing system, anaesthetic record and post-operative notes were then reviewed to identify:

- Patient demographics
- Infection control alerts
- Allergy status
- If the patient was receiving treatment IV antibiotics 24 hours prior to surgery (therefore no prophylaxis required)
- Operation details
- Antibiotic prophylaxis administered

All adult patients on the emergency and planned theatre lists at the Arrowe Park site were included in the audit. Those patients who were on IV antibiotics 24 hours prior to surgery, were under 18 years old, were having surgery in the women’s unit or were having surgery at the Clatterbridge site were not included in the audit. This was due to time restrictions and lack of guidance available for paediatric antibiotic prophylaxis.

RESULTS

During the data collection period 151 operations were performed. However, 33 patients could not be followed up since their notes were unavailable. No procedures exceeded four hours and no patients had blood loss greater than 1,500ml during surgery. No patient received an antibiotic that they were allergic to. The results following review of 118 patient case notes are summarised in Table 1. Table 2 shows the results for each surgical specialty.

Table 1: Summary of compliance with antibiotic prophylaxis guidelines

<table>
<thead>
<tr>
<th>Compliance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliant with WUTH guidelines</td>
</tr>
<tr>
<td>Unknown as not documented</td>
</tr>
<tr>
<td>Non-compliant with WUTH guidelines</td>
</tr>
<tr>
<td>No guidance available for procedure</td>
</tr>
</tbody>
</table>

REFERENCES

discuss what presumed prescriptions were compliant with WUTH guidelines. When this audit was previously performed in 2007, 40% of procedures were in accordance with the guidelines, 27% were not in accordance with the guidelines and 5% had no documentation of antibiotic prophylaxis given. Therefore there has been a significant improvement.

Gentamicin 160mg IV was used in preference to 120mg (the dose recommended in the guidelines) in 35% of the urological procedures performed. Gentamicin is currently stocked in vials of 80mg, therefore it is possible that prescribers chose to use two full vials for each patient rather than discarding the remaining 40mg.

For orthopaedic procedures two patients received a dose of gentamicin 120mg as opposed to the recommended 4mg/kg. As the previous guidelines recommended a dose of gentamicin 120mg on induction, it is possible that the anaesthetist and surgeon were unaware that the guidelines had been updated.

There was no guidance available for procedures carried out in 9% of patients. These included circumcision, cystoscopy, nephrectomy and fasciectomy of the hand; therefore it was not possible to determine compliance in these cases.

Surgeons and anaesthetists will be informed of these results to emphasise the importance of new electronic prescribing system. This may be able to incorporate the anaesthetic record and antibiotic prophylaxis decision pathway thus helping to improve compliance and reduce the number of instances where it was not possible to determine compliance.

**REFERENCES**


13. Are pharmacists clinically checking supplementary prescription charts?

H. Corrigan, D. Turley and V. Young

Pharmacy Department, Wirral University Teaching Hospital NHS Foundation Trust

Wirral University Teaching Hospital NHS Foundation Trust (WUTH) has used an electronic prescribing system (EPS) for approximately 20 years. Since it is not practical for all medicines to be prescribed on the EPS, a number of supplementary prescription charts are used. Supplementary prescription charts are used for medicines that require daily dose adjustments (eg, warfarin) and for intravenous (IV) infusions. Handwritten charts lack EPS safety mechanisms so there is more potential for human error. Additionally many of the medicines prescribed on supplementary charts are considered high risk medicines by the National Patient Safety Agency (eg, warfarin and insulin).

A key performance indicator described in WUTH’s medicines management policy states: “New inpatient medicines will be clinically checked by a pharmacist within 24 hours of prescribing.” The target for this indicator is 100%. A two-day audit carried out in November 2010 showed that 80% of medicines prescribed on the EPS were clinically checked by pharmacists within 24 hours of prescribing. In order to gain an overall picture of pharmacists clinically checking new inpatient medicines, an audit on supplementary prescription charts was required.

**OBJECTIVES**

- To identify the types of charts in use
- To identify the location of supplementary prescription charts on wards
- To determine whether pharmacists check newly prescribed inpatient medicines on supplementary prescription charts within 24 hours

**METHODOLOGY**

Over a two-day period (Monday and Wednesday) in February 2011 two surgery wards, two medicine wards, two elderly care wards and one children’s ward were visited to identify the location of the supplementary prescription charts and also the number and type of these charts per patient currently in use. All supplementary prescription charts identified were then reviewed to identify the number of medicines (including individual doses of insulin and warfarin prescribed) that were clinically checked within 24 hours. For the purpose of this study, each IV infusion or IV fluid was classified as one dose and each change to the oxygen prescription was classified as a new prescription.

**RESULTS**

A total of 37 patients had 40 supplementary prescription charts with 130 doses of medicines prescribed. The majority of charts were for IV infusions (see Table 1). The location of the charts varied and included at the end of beds, in medical notes and in separate folders. Only 2.3% (3/130) of doses had been clinically checked by a pharmacist within 24 hours of being prescribed.

**DISCUSSION**

The audit indicates that pharmacists clinically check significantly fewer medicines prescribed on supplementary prescription charts than those that are prescribed on the EPS. The three prescriptions that were checked within 24 hours were for caspofungin. Caspofungin requires a pharmacist clinical check prior to being prepared in the pharmacy aseptic unit. Possible explanations for the lack of clinical checks on supplementary prescription chart include:

- There was a lack of standardisation for the location of supplementary prescription charts. Thus it can be difficult for pharmacists to locate the charts. Additionally the EPS does not document if the patient has a supplementary prescription chart in use
- Clinical check of IV infusion fluids was included in this audit. It is not clearly defined in the WUTH Pharmaceutical Care Standards (PCPs) whether pharmacists are expected to clinically check all IV fluids or just IV drug infusions
- Uncertainty whether to clinically check in retrospect, i.e. when prescribing has occurred out of hours and medication has already been given

**Table 1: The type and number of charts, doses prescribed and whether these doses had been clinically checked within 24 hours**

<table>
<thead>
<tr>
<th>Type of chart</th>
<th>Number of charts</th>
<th>Number of doses prescribed</th>
<th>Number clinically checked</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>25</td>
<td>63</td>
<td>3</td>
</tr>
<tr>
<td>Warfarin</td>
<td>10</td>
<td>56</td>
<td>0</td>
</tr>
<tr>
<td>Insulin</td>
<td>3</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Oxygen</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>138</td>
<td>3</td>
</tr>
</tbody>
</table>
The oxygen and insulin supplementary prescription charts do not have a place for a pharmacist to indicate their clinical check. The IV and warfarin charts do have this facility.

Following the audit a number of recommendations have been made to improve the pharmacists’ clinical screening of supplementary prescription charts.

- Incorporate an electronic prompt on the patient’s electronic medication list, such as “see supplementary chart”, if the patient has medicines prescribed on supplementary charts. The trust is shortly introducing a new EPS and there are plans under way to incorporate supplementary prescription charts on the system which will improve clinical checking of these charts.
- Standardise the location where supplementary prescription charts are kept on wards.
- Amend insulin and oxygen prescription charts to include an area for pharmacists to sign.
- Update the PCSs to define what is expected of pharmacists when completing a clinical check of IV fluids; doses already administered; and a range of doses of the same medicine prescribed on the prescription chart.
- Consider the pharmacists’ training needs identified following the update of the PCSs.
- Feedback results and recommendations to pharmacists.
- Re-audit (with a seven-day data collection period) after implementation of the above recommendations.

METHOD

Our audit was undertaken in collaboration with consultant medical staff. A specially designed form was used to collect data on consecutive patients admitted to the acute cardiology wards. The initial audit was undertaken in November 2010. All medicines prescribed were noted and assessed. If a drug was prescribed without the availability of an affecting factor (one or more of the factors) then this was seen as a potential for medication error.

The initial audit identified a number of areas of poor practice and implemented some changes. A pocket sized booklet was produced listing the most commonly prescribed medicines in acute cardiology which are affected by one or more of the three factors (age, weight and CrCl). The booklet was distributed to cardiology doctors during a seminar highlighting the findings of the audit, and the impact of these factors on medicines prescribed in cardiology. A sticker was produced to encourage documentation of these factors on the drug chart. The audit was repeated in January 2011 to determine if there were any improvements. A short survey of nurses and medical staff was also used to identify barriers to meeting these standards.

RESULTS

The results are set out in Table 1. Documentation of weight was poor and there was no improvement after the intervention. Documentation of age and creatinine were increased following the intervention. CrCl was only calculated for one patient in the whole audit. From the first audit there were 118 cardiology drugs prescribed and in 63 of these drugs there was a potential for a medication error to occur due to lack of documentation of these three factors. Forty-nine (78%) of these potential errors were due to the absence of CrCl, four (6%) due to the absence of age and 10 (16%) due to the lack of accurate weight.

Five nurses and two doctors completed the short survey and identified the following barriers as main contributors to not meeting audit standards: lack of consistency and guidance in documenting a patient’s weight as it was documented on different sheets by healthcare professionals and not always on the drug charts, poor access to scales and practical difficulties in weighing patients.

DISCUSSION

Our audit revealed 63 (33%) potential cases of medication errors due to the lack of documentation of one or more of the factors. This high potential for medication errors confirms the importance of the recommendations made by the AHA. Between January 2005 and September 2009, the National Patient Safety Agency received 2,716 patient safety incident reports relating to dosing errors concerning low molecular weight heparins (LMWH), which are among the most prescribed medicines in cardiology. The National Patient Safety Agency’s rapid response report emphasised the importance of documenting accurate weight and renal function for all patients prescribed LMWH.

The booklet on cardiology drugs and renal function was met with enthusiasm from the medical staff but had little impact on the actual documentation of weight and CrCl in specific. Despite the positive response and keenness of the doctors, the lack of patients’ weights on admission was a major hindrance to the required standard. This revealed the need for a different intervention targeted at improving weighing patients on admission. Making the weighing of patients on admission routine practice and providing the necessary measures for implementation, eg, a requirement for weight on the electronic admission notes is recommended. A specific section on the drug chart or medical record to record creatinine clearance could help recording and reduce the potential for error.

The audits had a number of limitations: it was difficult to establish which factors had actually been considered when prescribing; and the timing of the intervention was poor due to rotation of the junior doctors.

<table>
<thead>
<tr>
<th>Table 1: Audit and re-audit results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criterion</td>
</tr>
<tr>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Number of patients audited</td>
</tr>
<tr>
<td>Weight documented</td>
</tr>
<tr>
<td>Age documented</td>
</tr>
<tr>
<td>Serum creatinine documented</td>
</tr>
</tbody>
</table>
The accurate documentation of weight, age, and CrCl should be made part of the prescribing standards in the trust to reduce potential medication errors. In addition to raising awareness and educational interventions, the hospital needs to provide practical, IT and policy measures to enable weighing patients on admission and calculating CrCl.

REFERENCES

15. An audit of the use of pregabalin in the National Spinal Injuries Centre at Buckinghamshire Healthcare NHS Trust

R. Savjani and B. Badiani
Buckinghamshire Healthcare NHS Trust

Neuropathic pain is defined as “pain arising as a direct consequence of a lesion or a disease affecting the somatosensory system”.1 It is caused by several conditions such as spinal cord injury, stroke, multiple sclerosis, diabetes mellitus and neoplasia. Variation in how treatment is initiated and incorrect sequencing of therapeutic classes can lead to inadequate pain control and morbidity. Pregabalin is an anticonvulsant used for the treatment of neuropathic pain; however, its use as first line therapy for neuropathic pain as recommended by the National Institute for Health and Clinical Excellence (NICE) is controversial partly due the costs associated in comparison to other therapies.2

The National Spinal Injuries Centre at Stoke Mandeville Hospital is a tertiary referral centre and is a specialty in which pregabalin is commonly used; however, pregabalin is not on the trust formulary. This audit is necessary to evaluate the current prescribing patterns of pregabalin within the NSIC as there is currently no guideline available for the use of pregabalin within the trust, and to evaluate the adherence to current trust guidelines for neuropathic pain with respect to the use of other agents.3

The standards for this audit are:
1 100% of patients should have been prescribed first and second line treatments for neuropathic pain as per the Trust guidelines for neuropathic pain before being switched to pregabalin
2 100% of patients should have been titrated up to the maximum (tolerable) dose of first and second line treatments before initiating pregabalin
3 100% of patients should have reported intolerable side effects or inadequate pain control with first and second line treatments before initiating pregabalin

OBJECTIVES
1 To determine the percentage of patients previously prescribed first and second line treatments
2 To determine the percentage of patients that have experienced intolerable side effects or insufficient pain control with first and second line treatments
3 To estimate cost savings for the trust if patients currently on pregabalin who have not previously prescribed first or second line treatments are switched back to first line treatments

METHOD
This was a retrospective audit of patients’ notes from the NSIC. Patients prescribed pregabalin over a 12-month period between 1 November 2009 and 1 November 2010 were identified from the pharmacy computer system and a Crystal report was used to identify patients under the care of a spinal consultant. A data collection form was designed to assess prescribing sequence, dose, reasons for initiation and withdrawal and side effects. For the purposes of this audit the following medicines were accepted as first or second line: amitriptyline and gabapentin. Maximum doses were as stated in the BNF 60. The data collection form was piloted and the layout of the data collection form was amended. Cost saving analysis was performed on patients identified as not previously being prescribed first and second treatments and it was based on treatment on maximum doses of first and second line therapies for one year in comparison to treatment with the current dose of pregabalin for one year. The data were kept confidential and anonymised wherever possible. All the data were collected by the researcher and analysed using Microsoft Excel.

RESULTS
Thirty-eight patients in the NSIC were prescribed pregabalin in the 12-month period analysed. Twenty-one (55%) patients had been previously prescribed first and/or second line treatments. None of the patients on first or second line treatments were titrated up to the maximum doses. One (3%) had documented side effects causing a change to pregabalin. The results are summarised in Table 1.

Table 1: Summary of the numbers of patients prescribed first and/or second line therapy and the reason for initiating pregabalin therapy (n=38)

<table>
<thead>
<tr>
<th>Reason for Switching</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>First and/or second line therapy prescribed</td>
<td>21 (55%)</td>
</tr>
<tr>
<td>Maximum doses of first and/or second line therapy prescribed</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Inadequate pain control with first and second line therapy</td>
<td>5 (13%)</td>
</tr>
<tr>
<td>Intolerable side effects reported</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>No reason for starting pregabalin documented</td>
<td>6 (16%)</td>
</tr>
</tbody>
</table>

Performance against the standards:
1 100% of the patients should have been prescribed first and second line treatments as per the trust guidelines for neuropathic pain before being switched to pregabalin. Observed adherence = 55%
2 100% of the patients should have been titrated up to the maximum (tolerable) dose of first and second line treatments before initiating pregabalin. Observed adherence = 0%
3 100% of patients should have reported intolerable side effects or inadequate pain control with first and second line treatments before initiating pregabalin. Observed adherence = 8%

If patients who had not been prescribed other therapies were switched to maximum doses of first- and second-line treatments this could result in an estimated cost saving for the trust of £14,922–£18,117 per annum.

DISCUSSION
The NSIC was not compliant with the standards or trust guidelines. The limitations of this audit were the lack of information about patients’ previous medication history while in other trusts and number of volumes of notes per patient. It is recommended that patients identified as not having been prescribed first or second line treatment require a review of their current therapy. A review by the Formulary Management Committee is required to ensure the non-formulary request process for pregabalin is more robust and a review of the current trust guidelines is required to clarify the position of pregabalin in the treatment of neuropathic pain in patients with a spinal cord injury. The current NICE guidance for the management of neuropathic pain in adults is being reviewed and a decision is due to take place in March 2013. A re-audit should be performed in light of the new guidelines to assess the NSIC’s compliance.

REFERENCES
1 Freyhagen R, Bennett M: Diagnosis and management of neuropathic pain. BMJ 2009 Aug 15; 339: 391-95
16. An audit of time taken from admission to medicines reconciliation

R. J. Boldero, J. Gilbertson, J. Goddard
Welsh Pharmacists Project Oversight Group, Wales

Over one-third of patients have medication errors on admission to hospital, with over four-fifths of these errors originating from inaccurate medication histories. In late 2007 the National Patient Safety Agency and National Institute for Health and Clinical Excellence (NICE) released their first joint patient safety solution. They recommended that all healthcare organisations that admit adult inpatients should make sure that they have policies in place for medicines reconciliation on admission, and that a pharmacist is involved with medicines reconciliation as fast as possible after admission. Currently there is a core efficiency and productivity performance indicator set by the Welsh Assembly Government that health boards measure the percentage of patients with their medicines reconciled by pharmacy within 24 hours of admission. This audit measures compliance with the standard for medicines reconciliation to be undertaken by pharmacy within 24 hours of admission across 14 acute hospital sites in Wales.

OBJECTIVES

- To identify the time taken from patient admission to medicines reconciliation across 14 hospital sites in Wales
- To calculate the percentage of patients who have their medicines reconciled within 24 hours of admission
- To identify reasons for medicines not being reconciled
- To investigate the effect of weekend admissions on medicines reconciliation

METHODS

Fourteen acute hospital sites from across Wales agreed to take part in this study as part of the All Wales preregistration pharmacist audit process. To ensure comparable data from across each site a uniform method was employed. A centrally produced data collection form was sent to each participating site for piloting. Comments were collated and the form amended. Guidance for sites was also given as a frequently asked questions document. Data collection commenced on a Thursday for a continuous 14-day period between October 2010 and February 2011 on the emergency admission unit at each site. Individual reports were written and submitted at each site by the resident preregistration pharmacist. In addition, all of the data collected was entered into an electronic database and sent to the central data coordinator. The data from all sites were then analysed as one data set.

RESULTS

In total the 14 hospitals from across Wales which participated in the study gave a patient population of 2,830. Of all patients admitted, 55% per cent (n=1,556/2,830) had their medicines reconciled within 24 hours of their admission. When excluding those patients who had no medicines reconciliation during their stay, 76 per cent (n=1,556/2,060) had their medicines reconciled within 24 hours. The main reason for non-completion of medicines reconciliation was discharge being 61 per cent (n=476/774). Other reasons included weekend admission, transfer to another hospital and death. If those patients with medicines not reconciled due to death, discharge or transfer to another hospital are excluded (n=522), 67 per cent (1,556/2,308) of remaining patients had their medicines reconciled within 24 hours. Of these 89 per cent (n=2,060/2,308) had medicines reconciliation at some point during their stay. Table 1 summarises the varying percentages of medicines reconciliation within 24 hours.

For weekdays there were 255 recorded pharmacy visits to admission units, and for weekends there were 14. For the patients in whom their age was recorded 79 per cent (n=351/446) over 65 years of age were taking six or more medicines prior to admission.

<table>
<thead>
<tr>
<th>Weekdays</th>
<th>Medicines reconciliation within 24 hours (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>60% (n=1327/2197)</td>
</tr>
<tr>
<td>Excluding patients discharged, transferred to another hospital or died</td>
<td>75% (n=1327/1777)</td>
</tr>
<tr>
<td>Weekends</td>
<td>36% (n=224/630)</td>
</tr>
<tr>
<td>Excluding patients discharged, transferred to another hospital or died</td>
<td>43% (n=224/522)</td>
</tr>
</tbody>
</table>

DISCUSSION

It is clear that across Wales the 24-hour timeframe for medicines reconciliation is not being achieved. As a number of patients are discharged, transferred to another hospital or die within 24 hours of admission it is highly unlikely that the target of 100 per cent medicines reconciliation within 24 hours could ever be achieved. However, if these patients are excluded, only 67 per cent had their medicines reconciled within 24 hours of admission.

Admissions at weekends have a decreased rate of reconciliation within 24 hours. This could be due to variances in the pharmacy service provided, which requires further investigation, as to do the roles of the different pharmacy staff groups on admission wards. For the patients in whom age was recorded there is a high percentage taking at least six medicines. However, a limitation to this study is that age has only been recorded for about a quarter of patients and in future the presence of a tick box on the data collection form for patients over 65 years of age could be used.

Across Wales pharmacy as a service is achieving medicines reconciliation within 24 hours for 55 per cent of patients. This study has shown there is a notable variance in this rate between weekdays and weekends. Possible influences on this rate may be both those attributable to pharmacy such as service time, as well as factors outside of pharmacy control. Therefore is 24 hours a realistic timeframe for all patients to have their medicines reconciled by pharmacy following admission to hospital?

REFERENCES


17. Initial prescribing of empirical antibiotics for community acquired pneumonia at Brighton and Sussex University Hospitals NHS Trust

S. Bandobranski Osvald and S. Lippett
Brighton and Sussex University Hospitals NHS Trust, Brighton

The mortality rate in high severity community acquired pneumonia (CAP) can be as high as 15–40%.1 CAP should be treated according to clinical judgment supported by the CURB-65 score: one point each for Confusion, Urea >7 mmol/L, Respiratory rate≥30/min, Blood pressure (systolic <90 mm Hg or diastolic 60 mm Hg), age 65 years.1 All patients admitted to hospital with CAP should have the first dose of antibiotics administered within four hours.1,2 Each hour of delay in severe sepsis can decrease survival by 7.6%.1

Over-use of broad-spectrum antibiotics is associated with rising antibiotic resistance rates4 and increased risk of Clostridium difficile infection, eg, co-amoxiclav, quinolones and cephalosporins.5

Brighton and Sussex University Hospitals (BSUH) adult empirical antibiotic guidelines are evidence-based, reflecting British Thoracic Society

United Kingdom Clinical Pharmacy Association autumn symposium 2011

Clinical Pharmacist April 2012 Supplement 2
To determine compliance of initial empirical antibiotic prescribing for CURB-65 score: low (CURB-65 = 0-1), moderate (CURB-65 = 2) or high (CURB-65 □ 3). Time zero was taken to be the time the patient was first booked at A&E. Data collected was entered into Microsoft Excel and analysed.

In cases where CAP severity was not specified, the auditor inferred the severity based on trust guidelines (n=36)

<table>
<thead>
<tr>
<th>Table 1: Compliance of initial empirical antibiotic prescribing with trust guidelines (n=36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Element</td>
</tr>
<tr>
<td>Choice of antibiotics</td>
</tr>
<tr>
<td>Dose</td>
</tr>
<tr>
<td>Route</td>
</tr>
<tr>
<td>Duration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Compliance with documentation requirements of the guidelines (n=36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documentation requirement</td>
</tr>
<tr>
<td>Medical notes indication</td>
</tr>
<tr>
<td>Medical notes duration</td>
</tr>
<tr>
<td>Drug chart indication</td>
</tr>
<tr>
<td>Drug chart duration</td>
</tr>
</tbody>
</table>

OBJECTIVES

- To determine compliance of initial empirical antibiotic prescribing for CAP with BSHU guidelines incorporating choice of antibiotic(s), dose, route of administration and proposed duration (standard = 100%).
- To determine if trust standards for documentation of antimicrobials are being met (standard = 100%).
- To determine if the length of time to first dose administration is within 4 hours (standard = 100%).

METHOD

The data collection form was piloted for two weeks. Data were collected by a single auditor (preregistration pharmacist) on a once weekly basis between October 2010 and January 2011 at the Royal Sussex County Hospital (RSHC) and the Princess Royal Hospital (PRH). A total of five wards were audited, all of which admit patients managed by general medicine or respiratory consultants. Suitable patients were selected by the auditor from medical/nursing handover sheets or identified by the ward pharmacists. Data were collected from patients' medical notes and drug charts, and when necessary retrieved from an electronic results-reporting system. In cases of which admittance patients managed by general medicine or respiratory consultants.

RESULTS

Adherence to the guidelines with respect to all prescribing elements (ie, choice of antibiotics, dose, route and duration) was achieved in two patients (6%). Table 1 presents the results for individual elements.

DISCUSSION

The results indicate the tendency of prescribers to unjustifiably select co-amoxiclav or ceftriaxone/levofloxacin if penicillin allergy (81% of non-compliant cases) whereas BTS estimate that only one third of admissions to hospital will be high severity. There is a belief among doctors that all patients admitted to hospital with CAP are high severity.

Further proposed measures to increase adherence to the guidelines and documentation standards include: further training for all grades of doctors, including diagnosis of severity, use of "antibiotic review" stickers by pharmacists in medical notes and collaborative audits with doctors with a 'competitive' element between teams.

This audit will be presented to the Antimicrobial Stewardship Group and at Respiratory Clinical Governance. Senior doctors will be encouraged to influence and educate their junior colleagues. Pharmacists should challenge inappropriate antibiotic prescribing at the point of prescribing (eg, post-take ward rounds) which will also act as an educational opportunity.

Investigating reasons for not reaching the first dose administration within four hours target was outside this audit's remit.

REFERENCES


18. How accurate are pharmacists at writing drug charts? An audit of drug charts written by pharmacists in orthopaedic pre-admission clinic for patients undergoing elective surgery

S. Sparrow, C. Venus and H. Dillon

Department of Orthopaedics and Pharmacy, Norfolk and Norwich University Hospital Foundation Trust

Inaccuracies in the clerking of medication histories and the subsequent prescription errors are well documented within areas of surgery.1-4 An audit conducted at the NUH in 2008 showed that 70% (n=43) of drug charts written within orthopaedics by doctors required pharmacist intervention.5

This led to a business case for a new pharmacist service dedicated to orthopaedics.6

Pharmacist involvement preoperatively has been shown to reduce medication errors and improve patient safety.1-4 Elective orthopaedic patients, under the care of 20 consultants at the NUH, are seen in orthopaedic pre-admission clinic (OPAC) by an orthopaedic pharmacist. The pharmacist assesses them, takes their drug history and writes their drug chart which is then filed in their notes ready for their admission. Since initiating the orthopaedic pharmacist service in June 2010 the impact on the accuracy and completeness of drug charts has not been assessed.

OBJECTIVE

The objective of this audit is to see whether the service provided by the pharmacists meets the standards set by the local medicines policy, antibiotic policy and thrombophrophylaxis policy. The following standards have been identified to reflect this.

STANDARDS

The aim is to achieve 100% for all standards except thrombophrophylaxis risk assessment (TRA) completion, where the trust target is to achieve 90%.

1 No omissions or errors in drug history clerking, excluding those medicines initiated or amended since attending OPAC
2 Completion of thrombophrophylaxis risk assessment (TRA)
3 Prescribing of tinzaparin (as thromboprophylaxis) in line with trust guidelines
4 Prescribing of prophylactic antibiotics in line with trust guidelines
5 Complete allergy status
6 Pre-operative medications prescribed if appropriate
To establish the incidence of delayed or missed doses of PD medicines for Parkinson’s disease inpatients during the pre- and post-intervention periods. The study objectives included:

1. To examine the data for time(s) during an admission or clinical areas where doses were more likely to be delayed or missed
2. To re-audit once the intervention was in place to measure its success
3. To redesign medicine management systems and procedures (the intervention) with the aim of eliminating delayed or missed doses of PD medicines

**METHOD**

A multidisciplinary audit group was convened to design the audit; it comprised a neurologist, specialist registrar, specialist nurses, pharmacists and a lay member of the local branch of the PDS. The group met again, once the results from the pre-intervention period were available, to design the intervention. A three-month period from 2009 was selected so that a reasonable number of PD inpatients could be included in the audit and so that the same period (of 2010) could be audited in a timely fashion after implementation of the chosen interventions.

**REFERENCES**


**RECOMMENDATIONS**

The results show that the quality of the prescriptions has increased with pharmacists writing the drug charts, indicating that this should expand to encompass all orthopaedic drug charts.

7. Peri-operative medicines prescribed in pre-admission clinic are appropriate (ie, analgesia and laxatives that are initiated) according to local anaesthetic guidelines
8. Octensian prescribed according to trust guidelines for MRSA prophylaxis

**DISCUSSION**

Most centres that have pre-operative pharmacist involvement do not require the pharmacist to write the drug chart for all patients seen within OPAC, irrespective of the consultant. The OPAC pharmacists at the NNUH write the drug charts for an average of 125 patients a week. Changing from 10 rotating SHOs to two pharmacists could have potentially increased the error rate; however, the results illustrated in Table 1 demonstrate that this is not the case. Comparing data from the audit in 2008, prescription errors on admission have fallen from 70% to 4% since the introduction of pharmacists to the OPAC. The data collection period was not pre-planned and with a six-week lag phase between patient attendance at OPAC and their admission, the collection period was a true reflection on pharmacist practice.

No drug charts were intentionally excluded from the data collection set; those not seen were either admitted as day cases through the day procedure unit or boarded on a non-orthopaedic ward due to bed pressures. Thirteen charts were written by a doctor either because the original was missing or because patients were admitted under the care of one consultant who does not use OPAC.

Having pharmacists in OPAC allows proactive interventions to be made in many areas, particularly when developing treatment plans around missed doses which impacts on the Parkinson’s “get it on time” campaign, CQUINS targets, patient safety agendas — the National Patient Safety Agency for opiates, high risk injections to name a few and thromboprophylaxis risk assessment (TRA). Further study is planned to quantify the impact of pharmacist involvement at OPAC on these targets.

**LIMITATIONS**

One of the limitations of this study was the choice of the data collection period. Winter bed pressures, volume of trauma and norovirus had meant that many elective surgeries were cancelled or admitted onto a non-orthopaedic ward, limiting the data set. A limitation to achieving 100% for standards such as TRA completion and prescribing of antibiotic prophylaxis is the limited guidance and lack of consultant consensus in these areas.

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**Table 1: Drug charts written by pharmacists (n=55) — adherence to standards**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Charts meeting each standard (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No omissions or errors in drug history clerking</td>
<td>96</td>
</tr>
<tr>
<td>Completion of TRA</td>
<td>95</td>
</tr>
<tr>
<td>Prescribing of tinzaparin in line with guidelines</td>
<td>100</td>
</tr>
<tr>
<td>Prescribing of antibiotics in line with guidelines</td>
<td>95</td>
</tr>
<tr>
<td>Complete allergy status</td>
<td>100</td>
</tr>
<tr>
<td>Pre-op medications appropriate</td>
<td>100</td>
</tr>
<tr>
<td>Peri-operative medications appropriate</td>
<td>100</td>
</tr>
<tr>
<td>Octensian prescribed</td>
<td>100</td>
</tr>
</tbody>
</table>
2. Review of stock lists on admission areas and emergency drug cupboards to ensure a comprehensive range of PD medicines was available outside pharmacy hours.

3. Addition of these particular issues surrounding PD medicines to the medical undergraduate curriculum.

4. A targeted educational campaign (operational pharmacy staff) on prioritisation of orders for critical medicines (including those for PD) in the dispensaries.

RESULTS

Full data sets were available for only 17 patients in the pre-intervention period and 18 patients in the post-intervention period. The number of patients who received all doses of their Parkinson’s medicines during the admission rose from three (18%) to five (28%) after the intervention. The median number of doses missed was also lower post-intervention as shown in Table 1; the small sample size precluded testing for statistical significance.

The first four hours of admission (correlating in most instances with time spent in the medical admissions suite) was the period when PD doses were most likely to be missed during an admission (57% of prescribed doses missed pre-intervention, 64% post-intervention); see Table 2. No individual medicine was more likely to be omitted than any other although a non-statistically significant trend was observed for patients prescribed more than one PD medicine to miss more medicine doses. The most commonly prescribed PD medicine was co-careldopa. No individual ward or clinical area appeared to perform significantly differently to the average.

DISCUSSION

The small sample size in this audit prevents firm conclusions, but it is interesting that the documentation of PD medicine administration was so poor that 65 of the 100 patients in our random sample had to be excluded from data analysis. It also raises the possibility that our data set is not representative of the sample or of the population. Our simple interventions appear to have increased the availability of PD medicines for inpatients to a clinically significant degree. After the first four hours of admission, fewer doses were omitted because they were not available; regular review and adjustment of ward stock levels can have a positive impact on patient outcomes. Why this should not also be the case for the admission areas is not clear, perhaps the initial process of patient assessment and stabilisation inherently delays dosing. There is room for improvement; anecdotal, nursing staff attitudes (to obtaining PD medicines urgently) have been resistant to change and further investigation of this is warranted. The advent of electronic prescribing at the trust presents opportunities for further systems changes.

Drugs traditionally have little appreciation of the calculations required at the preparation stage of the process, yet they are expected to be competent to prepare injectables if called upon to do so.

There is a wide disparity between the training offered to pharmacy operators preparing injectable medicines and practitioners preparing injectables in clinical areas where most training available relies upon peer observation and does not prove competency. The development of a kit allowing competence to be stated as Pass or Fail could be used to validate the skills of the NHS workforce in this specialist technical area.

OBJECTIVES

- To develop a prototype kit using nutrient broth to simulate the preparation of injectable medicines in clinical areas.
- To develop the kit such that an operator is able to be given a pass or fail with respect to their competence to prepare designated injectable preparations.
- To use a realistic scenario to test a practitioner's ability to perform drug calculations with respect to injectable medicine preparation appropriate to their practice.

METHOD

1. Commonly prepared injectable items in clinical areas were identified.

2. A prototype kit providing all the components (excluding readily available items eg syringes needles etc) was developed to simulate the preparation of two injectable medicines: (a) a bolus injection — simulating the addition of a diluent as would be the case when reconstituting a dry powder, and (b) an infusion — requiring the addition of an “active” medicine.

3. A calculation assessment was incorporated into the KIT via the introduction of a calculation scenario using various ways of expressing concentration was set up as a mock drug kardex. Junior doctors were required to interpret the kardex and then prepare the injectable medicines appropriately.

4. Three cohorts of first year foundation programme doctors performed the operator validation over three years and were assessed as Pass or Fail for aseptic non touch technique, and separately for calculation performance.

RESULTS

The results are set out in Table 1.

DISCUSSION

20. Development of an injectable medicine preparation competency kit for use in clinical areas

A. Black and J. Blagburn

Newcastle upon Tyne Hospitals NHS Foundation Trust

NHS organisations have a responsibility to ensure that their staff is trained and competent to prepare injectable medicines. The National Patient Safety Agency issued a Patient Safety Alert (PSA 20) in 2007 entitled "Promoting the safety of injectable medicines". A required action for the NHS was to “provide training for, and supervision of, all healthcare staff involved in prescribing, preparing, administering and monitoring injectable medicines”. The Department of Health Never Event List® has reinforced the importance of this by highlighting wrongly prepared high risk injectables. It is therefore of paramount importance that organisations can demonstrate that they have trained their staff in injectable medicine preparation.

Drug calculations associated with injectable medicines often are a cause of concern to practitioners at whatever stage of the medication process they are involved whether prescribing, preparation administration or monitoring. Doctors traditionally have little appreciation of the calculations required at the preparation stage of the process, yet they are expected to be competent to prepare injectables if called upon to do so.

There is a wide disparity between the training offered to pharmacy operators preparing injectable medicines and practitioners preparing injectables in clinical areas where most training available relies upon peer observation and does not prove competency. The development of a kit allowing competence to be stated as Pass or Fail could be used to validate the skills of the NHS workforce in this specialist technical area.
The test of aseptic non touch technique demonstrated that it is able to successfully identify operators with poor technique. The kit uses nutrient broth, which means that after incubation for a defined period at a defined temperature, the absence of microbial growth in the two prepared injectables and the two vials supplied demonstrates that the operator has used an aseptic non touch technique and is, therefore, deemed competent to prepare these injectable medicines. Conversely, any growth in the items would result in a FAIL. This is based upon the same principle upon which pharmacy aseptics operators are validated.¹

The calculation arm of the assessment has evolved over the three years in which it has been in use, and now represents a significant challenge, appropriate to the practitioners for which it has been used. For example in 2010–11, when presented with a 20mL vial of a 2% w/v solution, the practitioners were required to calculate the volume required in order to prepare a 200mg dose. The majority of the 50% of practitioners who were unable to complete the calculation without assistance failed to understand the concept of concentration expressed as a percentage. The consequence of this was that they were required to attend a further training session re drug calculations and complete four written calculations correctly. Those who still were experiencing difficulty were then given individual instruction by a foundation programme tutor.

The use of this kit has demonstrated that those healthcare practitioners who have used it have valued the experience and feel more confident in their ability (feedback questionnaire analysis).

The funding for the kit including incubation and reading has been made available from the trust foundation programme Training budget. If the use of this kit was extended to other practitioners (eg, nurses), the relatively high costs would, inevitably, decrease and NHS organisations would be able to validate their clinical workforce in a way that has not been available before. This would, in turn, enable the quality of care in this widespread (covers primary and secondary care) yet specialist technical area to be assured.

**REFERENCES**


21. The impact of electronic prescribing on a clinical pharmacy team.

J. Blagburn, S. Morris and V. Woodhall
Newcastle upon Tyne Hospitals NHS Foundation Trust, Newcastle upon Tyne

There are a number of published resources to facilitate implementation of electronic prescribing in hospitals, including reports from NHS Connecting for Health.³ None has specifically addressed the impact on clinical pharmacy practice. Our department has active reflective practice groups; members meet regularly to discuss personal, professional and service developments. It was noted that implementation of electronic prescribing within the trust appeared to have driven changes in our practice.

**OBJECTIVES**

- To describe the changes in clinical pharmacy practice resulting from introduction of electronic prescribing
- To make suggestions for clinical pharmacy teams in other trusts who have yet to face the challenge of electronic prescribing

**METHOD**

A reflective pharmacy practice group was tasked with a formal reflection on the impact of electronic prescribing on their clinical practice. The group contained one clinical pharmacy technician, three junior clinical pharmacists and three directorate pharmacists. There was no set model for reflection but all group members chose to use either the Gibbs or Johns models.²³

**RESULTS**

Several themes were established in the reflective pieces produced: (1) resistance to change; (2) trying to adapt old ways of working to the new system; (3) evolving new ways of working; and (4) adapting the system.

**Resistance to change** Anecdotally, pharmacists were not the only staff group who struggled to adapt to the new system; medical staff in particular were resistant to the change. Training of clinical staff took place over several months prior to introduction of electronic prescribing but the pharmacists felt they could not appreciate what was being asked of them until the system was live. Teething problems with hardware and software were significant causes of workplace stress for clinical pharmacy practitioners: “I was shocked and clutched, it was like a foreign language” (Band 6 pharmacist); “I didn’t know how I was going to cope with the extra work I now had to do” (Band 8a pharmacist); “I felt I was being asked to use a worse system than we had before and I had no choice; it was disheartening” (Band 7 pharmacist).

**Evolving new ways of working** “I spend more time talking to patients and reconciling their medicines because I can quickly identify newly prescribed or changed medicines on my ward” (clinical pharmacy technician); “I would have to say it has revolutionized my practice” (Band 6 pharmacist, who then goes on to describe how processes have changed but with no reflection on whether the content of their practice has changed); “Risks that I previously accepted were not manageable because of lack of pharmacy resource in my directorate, became manageable and therefore had to be managed. I had to make some difficult defensible decisions about our practice model” (Band 8 pharmacist).

**Adapting the system** Clinical pharmacists continue to identify risks in the system that did not exist (or were better managed) with paper prescriptions; iterative prescriptions such as warfarin and insulin being typical examples. A two-way dialogue between clinical pharmacy and informatics has improved risk management in the system significantly.

**DISCUSSION**

It is worth noting that individual group members are at different stages in developing their reflective thinking and, therefore, reflective writing skills; there are likely to be some learning points that the group did not identify.

Training for clinical pharmacists took place immediately before the system went live; engaging the clinical pharmacy team as stakeholders earlier in the process may have reduced resistance to change and allowed the team to develop new systems of working in a more timely manner.

A lag time between “go-live” and redesigning clinical pharmacy processes is apparent from our reflective work. Clinical pharmacy teams yet to face this challenge should be prepared to deconstruct their workstreams and processes in advance so that they can be rebuilt around the electronic prescribing

<table>
<thead>
<tr>
<th>Intake year</th>
<th>Aseptic non touch technique</th>
<th>Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008–09</td>
<td>0 fails*</td>
<td>Pass 80%, fail 20%</td>
</tr>
<tr>
<td>2009–10</td>
<td>2 fails*</td>
<td>Pass 100%, fail 0%</td>
</tr>
<tr>
<td>2010–11</td>
<td>3 fails*</td>
<td>Pass 50%, fail 50%</td>
</tr>
</tbody>
</table>

* There were between 65 and 75 participants each year

Table 1: Results
22. A project to reduce the number of missed doses due to drug unavailability within North Bristol NHS Trust

A. M. Mundell
Department of Pharmacy, North Bristol NHS Trust

North Bristol NHS Trust (NBT) has been involved with patient safety work since 2007. In November 2009 a one-day snapshot on all missed doses due to drug unavailability (code 6) was undertaken within North Bristol NHS Trust. There were 602 missed doses on 744 prescription charts seen (incidence = 0.81). In February 2010 the National Patient Safety Agency (NPSA) published a rapid response report on reducing harm from omitted and delayed medicines in hospital. Report highlights that the omission of even one medicine can harm a patient. In addition the commissioning for quality and innovation (CQUIN) set the trust a target of reducing the number of missed doses by 20% by December 2010.

OBJECTIVE
To reduce the number of missed doses due to “drug unavailability” by raising awareness at ward level.

METHOD
By implementing a number of small tests of change on one ward, a number of different systems to reduce the number of missed doses due to drug unavailability were trialled. The new system was gradually rolled out to all wards. During this time, feedback was received from patients, nursing and medical staff and processes amended accordingly. A missed dose handover sheet was developed that accompanied the nurse on their drug round to record any missed doses, documenting the patient details and the action taken during and out of pharmacy opening hours. This proforma was then taken to the nurse handover to highlight any missed doses and the nurse also recorded the date and time of when the drug was eventually given. Wards were also issued with a laminated flow chart of how to obtain non stock medication and a list of where a drug may be obtained out of hours.

A training package was written to highlight the problems and also the actions to be taken in an event of a missed dose. All wards received training by the ward pharmacist and all staff signed to say they had read the training package (this also included bank staff). Doctors were also trained on the importance of highlighting to nursing staff when they had prescribed a new medication. In line with the NPSA alert1 we developed a list of critical medicines where timeliness of administration is crucial.

In November 2010 a re-audit was undertaken on both sites; in addition we recorded any blank spaces in the administration record grid.

RESULTS
The results of the re-audit showed there were 201 code 6 missed doses on 738 charts seen (incidence = 0.29). We therefore dramatically reduced the number of missed doses due to drug unavailability and reached our CQUIN target (Table 1).

However, there were 249 incidences of blank spaces in the administration record grid. If we include this data this changed the results to: 469 missed doses on 738 patients charts seen (incidence = 0.64).

DISCUSSION
Within NBT the number of missed doses due to drug unavailability was dramatically reduced, although a large number of blank spaces in the administration record grid were identified. It is likely that these blanks correlate to nurses forgetting to sign rather than a missed dose although this needs to be clarified. It is vital that “blanks” are eliminated as they can lead to confusion as to whether a dose has been given.

The results of the audit were disseminated to ward managers and ward pharmacists. Pharmacists now monitor and collect data on a daily basis relating to missed doses and feedback any problems to ward staff. An e-audit tool has been launched on all wards to capture the number of missed doses or “blanks” in the previous 24 hours on five patients’ charts per ward each week. It was decided that nursing staff should complete this so they are aware of the problems on their ward.

Training on missed doses has continued for new nursing staff on wards and also incorporated into junior doctor induction. In particular we have highlighted to junior doctors the importance of informing nurses when they prescribe a new drug, particularly in the afternoons.

Although the target was achieved the audit will be repeated next year and the aim is to reduce the number of missed doses further. Future work will involve looking at the types of medications missed to ensure compliance with the NPSA alert for critical medicines. In addition dispensary processes will be monitored to ensure pharmacy are dispensing missed doses in a timely manner. Further work will also focus on the cause of blank administration spaces on the inpatient chart.

REFERENCES

23. The development and pilot of an ancillary sticker designed to aid the prescribing and monitoring of once daily gentamicin in adults

A. Clarkson, T. Hills and V. Weston
Nottingham University Hospitals, Nottingham

In 2008, it was highlighted by the trust medicines incident group that there had been a number of incidents involving the dosing and appropriate monitoring of gentamicin. The main risks associated with gentamicin use are nephrotoxicity and ototoxicity. A subgroup of the trust’s medicines management committee (MMC) was convened who suggested the development of a gentamicin prescribing sticker.

OBJECTIVE
To assess whether a gentamicin prescribing sticker improved prescribing practices and monitoring.

METHOD
An initial audit of gentamicin prescribing and monitoring was conducted over a one-month period across all wards. The results of this audit and analysis of the incidents were used to establish the information to include on the sticker. The sticker included prompts to check that an initial dose had not already been given.

Table 1: Comparison of number of missed doses before and after tests of change were implemented

<table>
<thead>
<tr>
<th></th>
<th>Baseline results (Nov 2009)</th>
<th>Results after changes (Nov 2010)</th>
<th>Results after changes including “blanks” (Nov 2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of missed doses</td>
<td>602</td>
<td>201</td>
<td>469</td>
</tr>
<tr>
<td>Number of inpatient charts seen</td>
<td>744</td>
<td>738</td>
<td>738</td>
</tr>
<tr>
<td>Incidence of missed doses</td>
<td>0.81</td>
<td>0.29</td>
<td>0.64</td>
</tr>
</tbody>
</table>
The sticker was subsequently adapted so the doctor must indicate if the patient is obese and if so they are prompted to use the trust dosing calculator on the antibiotics website. The sticker already stated to use CrCl not eGFR; continued education will be provided when launched. The box to indicate the time levels were measured was incomplete on all 24 stickers. This was removed and the trust ordering system for levels was adapted to make the date and time levels are measured mandatory fields in a date and time format. The administration time was regularly documented, which greatly assists in the interpretation of levels.

The major limitation of this study was that the pre-sticker audit included patients from all wards while the pilot was only within one speciality. Following results of this pilot were submitted to the trust MMC and clinical risk committee and the sticker has been approved to be launched throughout the trust. A post-launch audit is necessary to ensure the improvement in standards is maintained across the trust.

24. Can a patient prioritised clinical pharmacy service be effective?

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Pharmacist contribution to clinical care is well recognised. As a consequence collecting ward-based clinical activity has been undertaken within SUHT for over two years. It has provided an opportunity to measure clinical contribution to patient care by ward-based pharmacy staff. Due to NHS efficiency targets and the implementation of e-prescribing the service is under pressure to provide solutions to service redesign, delivering the same clinical contribution at less cost.

Within SUHT, a pharmacist visits every ward daily (Monday to Friday) to provide a clinical pharmacy service to all patients on the ward. A medicines management (MM) technician also visits each ward daily focusing on medication history taking, discharge medication and one stop dispensing. Investigations to increase the MM technician staff compliment and reduce pharmacist numbers have not provided this solution. This involved technician referral criteria to prioritise patients to be seen by the pharmacist. This was shown to be safe but significantly increased technician time on the ward without drastically reducing pharmacists’ time therefore increased overall costs.

At SUHT a patient prioritisation procedure is in place to guide the provision of clinical pharmacy services at times of short-term staff shortages.

OBJECTIVES

To assess pharmacy staff activity and interventions on wards receiving a prioritised pharmacy service as defined in the SUHT prioritisation procedure and to establish if this procedure provides a cost effective and safe long term solution for our clinical pharmacy service.

METHOD

In June 2011 a team of pharmacists within SUHT collected data on pharmacy staff activity and interventions on five wards receiving a prioritised pharmacy service as defined in the SUHT prioritisation procedure. The procedure lists the following criteria to select patients to be seen:

- Patients new to ward
- Any patient activating the modified early warning system (MEWS)
- Unstable patients with renal, liver or respiratory compromise
- Patients with acute sepsis
- Any patients for discharge
- Any patients with new items prescribed that need supplying

The pharmacists first saw the prioritised patients before seeing all other patients on the ward. Data were collected on two different coloured data collection forms for the two groups. The five wards selected covered a variety

in A&E or theatres, and the need to monitor fluid balance. Also included were spaces to document weight (use ideal body weight [IBW] if obese), renal function and timing of levels and the result. The initial audit data was then used for comparative purposes when the sticker was piloted. The sticker was commented on by numerous pharmacists and consultants and adapted accordingly.

The sticker was piloted on four stroke wards from 1 June to 3 August 2010, following MMC approval. Training packs were developed for nurses and doctors which outlined the process for completing the sticker. All nursing and medical staff were trained by the antimicrobial pharmacist using the pack. All pharmacists were informed of the pilot and doctors who would potentially cover on-call were informed at their weekly trust teaching. The teaching pack was kept with the intravenous drug guide on the wards and on the Trust antibiotics website as a reference source.

To assess the success of the pilot sticker, the antimicrobial pharmacist was informed of any patient prescribed gentamicin via the ward pharmacist. A list of all gentamicin levels taken on the four wards was sent daily to the antimicrobial pharmacist to identify patients for inclusion. All patients identified were included in the study; there were no exclusion criteria. The use of the sticker was audited against the following standards:

Sticker completion standards, 100% of the gentamicin stickers had:
- All sections completed correctly by prescriber (weight, renal function, dose, time required, signed, instruction on monitoring levels, time levels taken)
- All doses signed for by two nurses and the time of administration stated.

Dosing and monitoring standards, 100% of patients had:
- Creatinine clearance (CrCl) correctly calculated and correct dose prescribed as per trust guidelines.
- Levels measured at the correct time (18–24 hours post first dose) then minimum of twice weekly.
- For those receiving more than one dose, U&Es checked a minimum of twice weekly.

RESULTS

There were 24 gentamicin prescriptions and a total of 42 doses within the pilot. Overall, the introduction of the sticker led to better compliance with the dosing and monitoring standards (Table 1). Although the sticker improved prescribing and monitoring, only 8/24 stickers were fully completed by the prescriber. Of the 16 stickers which were incomplete there were 24 omissions detailed in Table 2. The time levels were taken were not documented on any of the 24 stickers but was usually added to the assay request card.

CrCl and dose were correctly calculated in 20 cases (83%). 10 patients received more than a single dose, U&Es were monitored appropriately in all cases and fluid balance monitored in five of the 10 cases.

DISCUSSION

The introduction of the sticker improved prescribing practices with respect to the dosing and monitoring of gentamicin. Of the four incorrectly calculated doses, two were due to lack of using dose determining weight in obese patients and two were due to using estimated glomerular filtration rate rather than CrCl.

| Table 1: Overall compliance with dosing and monitoring standards |
|------------------|------------------|------------------|
| Number of patients | Pre sticker | Pilot using sticker | P-value |
| Compliance with all dosing and monitoring standards | 14 | 24 | N/A |
| 5 (35.7%) | 17 (71%) | 0.0001 |

| Table 2: Compliance with sticker completion standards by the prescriber |
|------------------|------------------|
| Number of omissions | |
| Not ticked the not received gentamicin in the last 24 hours box | 4 |
| Dose selection not circled | 14 |
| Time required not documented | 4 |
| Weight not completed | 1 |
| Not specified level and give/wait | 3 |

REFERENCES


of specialties and range of average length of stays. The pharmacists covering these wards also covered a range of AIC bands from 6 to 8b.

RESULTS

Over a one-week period a total of 84 hours were spent on ward-based pharmacist activity across the five selected wards; 54 hours were spent reviewing priority patients and 30 hours were spent on non-priority patients. A total of 559 patients were seen and interventions were made on 56% of patients overall. A total of 243 patients were prioritised to be seen and interventions were made on 57% of these patients. A total of 316 patients were seen as non-priority and interventions made on 20% of these patients. See Figure 1.

DISCUSSION

The clinical pharmacy service provided to all wards at SUHT costs £13,000 per week to run but delivers cost avoidance to the trust of £100,000–£200,000 each week.4

This audit has shown that patient prioritisation according to the current procedure could reduce clinical pharmacy time by 15 hours per week on the selected wards. It has also shown that a significant number of interventions (including major interventions) would be missed.

The audit has shown that acute medical wards are not suitable for a prioritised clinical pharmacy service because a similar numbers of interventions were made across both groups of patients. The interventions did not have a common theme. For other specialities it may be possible to adjust the referral criteria to reduce the number of interventions missed. This would need to be investigated further.

The impact of prioritisation for longer than one week has not been investigated.

REFERENCES

3 Cerrato M, Pepperrell M. A project to determine if a new way of delivering clinical pharmacy services can save pharmacist time on the ward. UKCPA Symposium, Nottingham, May 2011.
4 Millen S. Benchmarking ward based clinical pharmacy activity. UKCPA Symposium, Daventry, November 2010.

25. Pharmaceutical care of postnatal women in hospital and the potential roles of the pharmacy team members

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Postnatal inpatient populations are becoming older and more complex.1 Models of pharmaceutical care in this patient group, is poorly described in the literature. Caring for this patient group with a limited workforce resource challenges the capacity of the service to consistently deliver quality patient care and more efficient delivery models are required. Working in pharmacy teams to provide pharmaceutical care has been described for general medical2 and surgical wards3 but not in obstetrics. This study aimed to explore the current and potential roles of pharmacy staff in the delivery of pharmaceutical care to postnatal women.

OBJECTIVES

To identify the potential and actual pharmaceutical care issues (PCIs) in postnatal hospital inpatients and the contributions made by an experienced clinical pharmacist

To agree on the most appropriate member of the clinical pharmacy team to address the PCIs related tasks

To propose a model for the clinical pharmacy service provision to postnatal inpatients

METHODS

A patient profile/pharmaceutical care plan (PP/PCP) was developed for postnatal women incorporating evidence based PCIs identified from a literature search and specialist practice. Following peer review, the PP/PCP was applied to a convenience sample of 170 consenting inpatients and the contributions made by an experienced clinical pharmacist were categorised, as checks or changes (if the contribution resulted in a change in drug therapy or drug therapy process) using a previously developed categorisation system.4

A postal questionnaire was sent to a nominal group (NG) of pharmacists (n=5) and technicians (n=5) to score on a scale 1-9 the appropriateness for pharmacists (Band 6–8a) or technicians to action the PCIs related tasks. Scores of 1–3 were inappropriate, 4–6 were equivocal and 7–9 were inappropriate. At the NG meeting the results were presented and discussed after which the participants could change their scores. There was said to be consensus if the final scores fell within a three-point range once the highest and lowest scores were discarded.5

The results of the NG were used to define the role of the technician and develop referral criteria for the patients who should be reviewed by the pharmacist.

RESULTS

Twenty-nine different PCIs were identified, some general (n=17) and others specific to obstetrics (n=12). Twenty-two of the most common PCIs have been incorporated into a standardised PP/PCP detailing actions and desired outcomes for use by the pharmacy team. There was a mean of 11.3 relevant PCI per patient (9.5 checks and 1.8 changes) and 87% of inpatients had changes to either their drug therapy or the drug therapy process.

Within the NG there was consensus that 10 (12%) of the PCI related tasks are appropriate and 46 (55%) inappropriate for pharmacy technicians to undertake. There was partial agreement for 11 (13%) tasks and no agreement for 16 (19%) tasks for technicians. There was consensus that all the tasks are appropriate for pharmacist to undertake.

Tasks agreed to be undertaken by pharmacy technicians include checking medication histories, medicines prescribed correctly, suitability of patient’s own medicines for use and patient suitability for self-administration, analgesics prescribed regularly for defined types of delivery, thromboprophylaxis prescribed for defined patient groups. They could also counsel women on medicines routinely used in obstetrics.

Following the NG, referral criteria (Panel 1) were proposed defining issues/patients to be referred to a pharmacist.
DISCUSSION

Extending the role of pharmacy technicians has been described in hospitals releasing pharmacist’s time to address more complex issues. The same consensus method was used to see if the role of midwives could be extended to reduce the out-of-hours work by junior doctors. Opinion sought in this study from pharmacists and pharmacy technicians confirmed that a proportion of PClS (mostly checks) could be delegated to suitably trained pharmacy technicians thus optimising the pharmacy skill mix in delivery of pharmaceutical care to postnatal women (currently provided by Band 6 and 8a pharmacists). To assure quality and safety of the model, referral criteria were agreed for testing along with the PP/PCP to facilitate delivery of a consistent quality of pharmaceutical care to postnatal inpatients. Implementation of this model of clinical pharmacy service provision will be evaluated both from a quality of care and economic perspectives within obstetrics with a view to further development, for application in other areas.

REFERENCES

26. Maximising skill mix by the introduction of a technician-led ward in elective orthopaedics at University Hospitals of Leicester (UHL) NHS Trust

K. Hall, N. Patel and A. Brailey
Pharmacy Department, University Hospitals of Leicester NHS Trust

In the surgery/musculoskeletal clinical pharmacy team at UHL, an opportunity arose to review ways of working when 1.5 whole time equivalent (wte) pharmacists posts were vacated with a combination of maternity leave and resignation.

Previous review of skill mix within the team highlighted that pharmacists were spending a significant amount of time performing tasks that could be provided by a technician. There was a clear need to increase the amount of technician input to these wards.

Changed staffing resources presented the opportunity to review further the ways of working and to ensure optimum use of the skills of technicians and pharmacists.

OBJECTIVE

The objective was to introduce a new way of working. The technician-led ward would empower the technician, working within guidelines, to take ownership of the pharmaceutical needs of the wards. This in turn would demonstrate a reduction in the amount of time spent on the wards by a pharmacist while continuing to provide a daily pharmacy service. This service would need to be acceptable to the users of the service and to have no detrimental effect on patient care as a minimum.

METHODS

It was essential that a comprehensive guideline was produced for the medicines management technician (MMT) to follow to ensure that patient safety was maintained. The aim of the guideline was also to give the MMT confidence to undertake this role. This document was named “Guideline for MMT-led clinical pharmacy service”. The guideline was written and circulated for comment within the team; it was then amended and validated.

The purpose of the document was to ensure that the MMT, working within guidelines understood what was expected with regard to provision of service and to give clear guidelines for the referral of patients to a pharmacist. Using guidelines, the MMT on completion of the ward visit would contact the assigned pharmacist who was then responsible to professionally check all of the identified charts/discharge letters.

A period of audit was essential. The purpose of this was to check that the referral criterion ensured patient safety and was comprehensive enough that only those patients requiring pharmacist input were referred. The audit would demonstrate if the referral criterion was sufficiently clear to allow the MMT to determine easily which patients needed to be referred. Also the audit highlighted that patients who met the referral criteria were not being missed.

RESULTS

Table 1 illustrates a reduction in pharmacist hours spent covering the targeted wards by between 18% and 51%. This data was obtained from the clinical performance indicator (CPI) database and compares data collected from October 2009 with the same time period from October 2010.

Audit results For 10 days following the introduction of the pilot a pharmacist audited every drug chart on the two orthopaedic wards. During this 10-day period it was established that every patient who fitted the referral criteria was referred to a pharmacist.

Auditing the non-referred patients helped to identify gaps in the referral criteria which should have been included in the original policy.

Nursing staff questionnaires A total of six questionnaires were sent out to key nurses across the two elective orthopaedic wards. Four questionnaires were returned. Out of the four, three answered positively for all questions, the fourth had noticed that charts were taken from the ward more often than before and that she missed the regular pharmacist presence she had had before. Issues around missing charts have been addressed to help minimise this.

Ward cover Since the introduction of the “technician-led ward” the elective orthopaedic wards have received pharmacy input every weekday. They receive a pharmacist visit twice weekly. For the remaining three weekdays a pharmacist will visit to professionally check any work which through the screening process has been identified by the MMT.

DISCUSSION

The results demonstrated a reduction in time spent by pharmacists by between almost 20% and 50% during six months from implementation. The fluctuations in time saved can be explained by periods of MMT annual leave when without an MMT the ward was covered daily by a pharmacist. The sustainability of this way of working is being explored by other areas with an aim to increase the capacity of MMT’s capable of working in this way.

A similar study has shown a smaller pharmacist time saving benefit when introduced into acute care wards. An elective surgical care ward is the area where this way of working has demonstrated greater time saving. This may be due to a more predictable patient case mix, coupled with patients and medicines which more readily fit protocol or guideline pharmaceutical care pathways.

The profile of the medicines management technician has been raised, as has her confidence and job satisfaction. Pharmacists have been able to focus on more complex clinical issues that increased their job satisfaction.
These changes have ensured greater flexibility of pharmacist resource in the MSK/surgery, team even though the number of pharmacists has been reduced.

In times of very challenging financial constraints this project has demonstrated a way of achieving maximum and appropriate use of pharmacy staff skills, potentially making efficiency savings whilst maintaining both patient safety and overall user satisfaction with services.

REFERENCES
1 Guideline for MMT led clinical pharmacy service July 2010.

RESULTS
Of 16 preregistration managers and 59 preregistration tutors (including 12 tutors who were also managers) a total number of 40 (response rate of 63.5% [40, n=63]) completed the online questionnaire.

The mini-CEX was used by 5.3% (2, n=38) in the PTP training year and all those who use this tool stated agreement with its feasibility to use in practice.

The ChD was used by 18.4% (7, n=38) of participants, with all finding this assessment tool useful and effective. The majority using the ChD (85.7%, 6, n=7) agreed that the assessment was feasible to take place in practice.

The MRCF was used by 8.1% (3, n=37) of respondents. Of the three tutors using the MRCF there was an agreement (100%, n=3) that this tool was an overall effective and useful assessment method.

The mini-Pat was used by one tutor (2.7%, n=37) 28.6% (10, n=35) of respondents use an assessment similar to the mini-PAT. Regarding the potential use of mini-PAT, 42.9% (6, n=14) of respondents believe mini-PAT is useful for the assessment of PTPs.

Replies from open text comments revealed issues such as lack of time and inadequate personnel for the implementation of these tools in the PTPs curriculum. In addition several tutors commented they were not aware to these assessment tools.

DISCUSSION
The current study comprises the first comprehensive examination of preregistration managers’ and tutors’ opinions on the utilisation of postgraduate assessment tools in PTPs. Preregistration managers and tutors were found to not routinely use the postgraduate workplace–based assessment tools to assess their PTPs despite them being used as assessment tools for diploma practitioners within the SE acute trusts.

Despite the small number of responses, it is clear that the principles of these types of assessment were accepted and considered as effective and appropriate for the training of PTP in those that used them and in many cases tutors were found to be willing to implement these assessment tools in the PTP training programme in the future.

Taking into account the fact that MRCF is part of the training program of PTPs in the South East it would be expected it would be the tool mostly used by tutors. PTPs attend a training event based around the principles of the MRCF. Nevertheless, only three tutors currently used this tool. This needs further investigation. Unpredictably, the mini-PAT (and its kins) is the tool mostly used by tutors, stressing out that feedback coming from various colleagues is much more effective and accepted by the trainee in question, rather from a single assessor.

Increased awareness of these tools to tutors would support their potential application to the PTP training year with the assurance that valid and reliable workplace–based assessment were being utilised to support the assessment process.

In general the findings shows there are some barriers for the implementation of these tools. However, there is an overall positive view by those that have used them on PTP. Further research to establish the usefulness and feasibility of new types of work based assessment over traditional methods for assessing PTPs in hospital is necessary as well as strategies that will help incorporate these tools as methods of assessment.

The use of mini-PATs within the PTP training year should also be further investigated as well as opinions of those not using the tools.

Limitations included that the length of the questionnaire could be considered long contributing to the low response rate. The low response rate brings into question the robustness of the results and how representative they are.

Acknowledgements: Emma Wright-Highly Specialist Pharmacist KSS Deanery (Pharmacy) and preregistration managers and tutors within SE Acute NHS trusts

REFERENCES

27. Postgraduate assessment tools in preregistration pharmacist trainees within South East of England acute trusts

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*School of Pharmacy & Biomolecular Sciences, University of Brighton; †Brighton & Sussex University Hospital Trust

There is an increasing drive towards the development of valid and reliable place assessment tools that can be used for preregistration pharmacist trainees (PTPs). Several assessment tools are currently utilised within postgraduate pharmacy studies, including the mini Clinical Evaluation Exercise (mini-CEX), Case-based Discussion (ChD), Medication Related Consultation Framework (MRCF) and mini Peer Assessment Tool (mini-Pat). Band 6 pharmacists within the SE would enter such a postgraduate diploma and be assessed using these tools.

The MRCF is an assessment tool initially developed and used by pharmacists and is currently part of the training programme of PTs in SE acute trusts, while the other tools were initially developed and utilised by medics.

OBJECTIVES
The aim was to evaluate the use and appropriateness of mini-CEX, ChD, MRCF and mini-Pat as a means of assessing clinical skills and competencies of PTPs in SE acute trusts.

The objectives were to

1 Identify if preregistration managers and tutors use mini-CEX, ChD, MRCF and mini-PAT
2 Determine the views of pre-registration managers and tutors on these assessment tool
3 Identify problems regarding the use of the four assessment tools within the PTP training year
4 Make recommendations on the use of these assessment tools

METHODS
Preregistration pharmacist managers and tutors working within the 16 South East Coast acute trusts were asked to participate in an online piloted questionnaire made available via Survey Monkey website during a two-week period. Two email reminders were sent to participants to complete the questionnaire. The questionnaire consisted of demographic information of the participants; were pertained to the utilisation of mini-CEX, ChD, MRCF and mini-PAT, further supported with the use of Likert-type questions exploring the usefulness, feasibility and effectiveness of each tool, as well as with the use of free text comment boxes, where participants could express their general opinions on these assessment tools. Ethical approval had been granted. Responses were analysed using Microsoft Office Excel 2007 and analysed using simple descriptive statistics including mean values and percentages, as well as frequency tables.
28. Use of clinical pharmacokinetic principles in optimising gentamicin dosing regimen in neonates

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Gentamicin is frequently used as empiric therapy, in combination with penicillin in the treatment of suspected or proven neonatal bacterial sepsis. Traditional (twice-daily) and once-daily dosing regimens are being used in the clinical practice. Improved treatment response has been demonstrated in patients who attained target peak and trough serum concentrations during treatment course. Pharmacokinetics of gentamicin changes during neonatal life, and it shows marked variability that complicates optimal dosing regimen of the drug. Therefore individual pharmacokinetic parameters values should be used in optimising gentamicin dosing regimen.

OBJECTIVE

The objective of the study was to appraise the peak and trough gentamicin levels, and to calculate individual gentamicin pharmacokinetic parameters in neonates treated with twice- or once-daily dosing regimen. Moreover the study aimed to assess whether it was necessary to modify administered gentamicin dosage schedules according to calculated individual pharmacokinetic parameters, and target peak and trough levels.

METHOD

The study was approved by the ethical committee of the Institute for Health Protection of Mother and Child “Dr Vukan Ćupić”, Belgrade, Serbia. This prospective study included 21 neonates, gestational age 37 weeks, who received gentamicin in daily dose of 5mg/kg (age 7 days) or 7.5mg/kg (age >7 days). Patients were randomly assigned to one of two groups based on dosing regimen: twice-daily (group I, n=8) or once-daily (group II, n=13). Gentamicin (20µg/2ml) was administered via one-hour intravenous infusion. Peak and trough serum steady state concentrations were measured using turbidimetric immunoassay method. Target peak and trough levels in twice-daily dosing regimen were 5–10, and <2µg/ml, respectively. Contrarily, in once-daily dosing regimen, peak level is not accurately defined and thus not informative since it is expected to reach levels above recommended for traditional dosing (eg, >15µg/ml), whereas trough is expected to be <1µg/ml. Individual pharmacokinetic parameters were calculated using one-compartment model. Statistical analysis was performed using software SPSS (version 17.0). The concept of linear pharmacokinetics and individual pharmacokinetic parameters were used for the adjustment of dosing regimen.

RESULTS

The mean value of gentamicin peak concentration was 7.26±1.27µg/ml in group I and 13.37±7.14µg/ml in group II. This difference was statistically significant (p<0.01). Average trough level was 1.90±1.08µg/ml in group I, and 1.40±0.56µg/ml in group II, and no statistical significance was observed. In four patients on twice-daily dosing regimen, trough levels were not <2µg/ml, and in all patients peak levels were in the recommended range. On the other hand, in eight neonates on the once-daily dosing regimen, trough levels did not reach targets, and in four patients peak levels >15µg/l were not achieved. Since gentamicin follows linear pharmacokinetics, no difference was observed in calculated pharmacokinetic parameters values between two dosing regimens. Hence, the values of pharmacokinetic parameters in the studied neonates were: clearance 0.06±0.049 l/kg/h, half-life 5.54±0.07 h, volume of distribution 0.29±0.13 l/kg. Each patient's concentrations and calculated individual pharmacokinetic parameters were considered, and in combination with target gentamicin levels, dosing regimen was adjusted for two patients. Optimising dosing regimen was proposed in two patients on once-daily dosing which included increasing dosing interval from 24 to 36 hours.

DISCUSSION

The use of gentamicin once-daily achieved higher peak, and lower trough levels over twice-daily dosing. This was expected according to the given dose and dosing interval. Individual pharmacokinetic parameters did not show statistical difference between two dosing regimens, as gentamicin follows linear pharmacokinetics. However, relatively high coefficients of variation for calculated pharmacokinetic parameters demonstrate significant interindividual pharmacokinetic variability of gentamicin in neonates. This emphasises the need for additional research. Therefore, our further steps will include population pharmacokinetic modelling as this approach emerged as method of choice for the determination of factors that contribute to pharmacokinetic variability, and hence dosing regimen.

Nevertheless, this study confirmed that based on the individual pharmacokinetic parameters, and target peak and trough levels the adjustment of dosing regimen was possible to accomplish.

REFERENCES


29. A baseline assessment of the pharmaceutical needs of adult patients admitted to Stoke Mandeville Hospital

M. Safadeh, L. Pazik and R. Kavanagh

Buckinghamshire Healthcare NHS Trust

In Buckinghamshire Healthcare NHS Trust (BHT) the emergency medicine pharmacy team (EMPT) consists of one Band 6 pharmacist, two Band 7 pharmacists and one lead Band 8a pharmacist. The Band 6 pharmacist is permanently based on the acute medical unit (AMU). The two Band 7 pharmacists cover two other acute medical wards and the accident and emergency unit (A&E) that includes a surgical admissions unit (SAU). The clinical pharmacy team identified a need for a referral system so that complex patients are identified consistently and referred on to more experienced members of the EMPT. In this context referral means the Band 6 pharmacist discusses the patient with a Band 7 pharmacist or the Band 8a pharmacist, which may result in the patient being reviewed again on the ward by the more senior team member. A literature search was carried out but no published checklists/toolkits were identified that assessed the pharmaceutical needs of patients on admission to hospital. The aim of the study was to create and trial a toolkit that identifies patients with complex pharmaceutical issues that will need referral to a senior pharmacist.

OBJECTIVES

1 To design a generic toolkit to assess and score pharmaceutical needs of patients on admission.
2 To use the toolkit to score the pharmaceutical needs of the patients admitted via the EMPT.
3 To classify the patient population with respect to pharmaceutical needs.
4 To identify which patient groups potentially have the greatest pharmaceutical needs according to the toolkit.
A data collection form (toolkit) was designed by the Clinical Services Manager and Director of Academic Pharmacy. The toolkit takes into consideration eight main categories: renal function, liver function, polypharmacy, adverse drug reactions, therapeutic drug monitoring (TDM), drug interactions, administration issues and drug specific issues. The categories were subdivided and a score was assigned for each pharmaceutical issue identified. For example, mild renal failure was given a score of 1 and severe renal failure was given a score of 3. The highest score possible was 19, which would indicate a patient with a wide range of pharmaceutical issues. As this was a baseline assessment the toolkit was not validated at this stage.

A pilot was carried out on 10 patients and it was found that no changes to the toolkit were necessary. Data collection was carried out over a two-week period between December 2010 and January 2011. All data was prospectively collected on admission into A&E, SAU, AMU and general medical wards by one Band 7 pharmacist, and each category and total patient scores were analysed in Microsoft Excel. There were no exclusion criteria. Following the data collection period the investigator and EMPT Band 8a pharmacist met to analyse the completed toolkits to identify any patients suitable for referral.

RESULTS
A total of 68 patients were reviewed. The age range was 25–95 years and 32 patients were male. Six of the patients were surgical and 62 were medical. Medical patients had higher scores than surgical ones. The median toolkit score was 3 and the mode was 1, with 67 patients having a score of 10 or less (Figure 1). The most common concerns with patients were polypharmacy and drug specific issues (Figure 2).

Following analysis of the toolkits by the Band 7 and Band 8a pharmacist a total of 23 out of the 68 patients were deemed suitable for referral by this review. It was found the more complex patients were consistently receiving higher scores making a stronger case for their referral.

DISCUSSION
The toolkit was designed in a way so that scores were weighted according to the severity of the issue in certain categories, eg, renal and liver impairment and toxicity of narrow therapeutic index drugs.

Due to the low numbers of surgical patients it was difficult to ascertain whether they present with a lower score than medical patients and this requires further investigation. Some patient groups were not appropriately represented using this toolkit. This was a trial toolkit and it became apparent that patients may achieve a low score but still require a review. For example a patient who was admitted with an overdose of paracetamol, citalopram, prochlorperazine and amitriptyline received a score of zero but on discussion it was felt that this type of patient may require referral and therefore the toolkit may need adjustment to include an overdose category. There were also some patients who received a higher score but were not deemed to require referral and this also requires further investigation and refinement of the toolkit.

Polypharmacy and drug administration issues were the most commonly occurring issues, followed by TDM, adverse drug reactions, interactions and renal impairment. As pharmacists we are seeing more patients with an increasing number of comorbidities who, as a result, will be on a number of different drugs including TDM drugs. These patients often require more pharmaceutical monitoring and care planning while in hospital.

The advantages of using this toolkit were that it allows the junior pharmacist to focus on and prioritise pharmaceutical needs of patients and the investigator found it quick and easy to use. However, there were some categories of pharmaceutical issue not included such as: drugs of abuse, drug overdoses and transplant patients. Further review may indicate the need for automatic referral groups such as admissions due to side effects from
chemotherapy, toxicity due to narrow therapeutic index drugs, anuric patients and transplant patients. This observational study has highlighted certain pharmaceutical issues that need to be addressed and incorporated into the toolkit without over-complicating it. In light of the results of the baseline study, the next phase is for the toolkit to be reviewed by the clinical pharmacy team, validated and subsequently re-piloted by junior pharmacists. The second phase should be carried out with more than one Band 6 pharmacist over a longer period of time and with a broader patient group.

30. Reducing medication errors using the patient’s own drug (POD) system and an integrated discharge prescription

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Complications arising from the use of medicines have been identified as one of the most common causes of adverse events in healthcare. In the UK approximately 5% of admissions into secondary care have resulted from preventable drug-related morbidity.¹ Over 50% of all medication errors and 20% of harmful errors occur due to poor communication of information at the interfaces of care.²

OBJECTIVES

- To reduce medication errors on admission and discharge by 20%
- To categorise the severity of medication errors that occur
- To identify risk factors to medication errors

METHOD

Approval for the study was obtained from the Healthcare Group. An observational study was carried out to identify if processes put in place on admission and discharge could reduce medication errors. The observational study consisted of a control and intervention group on admission and discharge which examined medication errors. Patients enrolled in the control groups received routine pharmacy service. Patients in the admission intervention group were enrolled in the patient’s own drugs (PODs) system while patients in the intervention discharge group received an integrated discharge prescription (IDP). The IDP incorporated the patient’s reconciled admission medication, in-hospital changes and discharge medication into one prescription.

The study population was drawn from patients who were admitted and discharged from two surgical wards. The calculated sample size was 38 patients in each group. The inclusion criteria consisted of patients taking three or more regular medications whose hospital stay exceeded 48 hours. Non-probability consecutive sampling was the technique used for selecting patients. Undocumented or unexplained discrepancies were brought to the attention of the prescriber. Medication discrepancies that were changed or discontinued were considered medication errors.

A comparison was made between the numbers of medication errors in the control group versus the intervention group on admission and discharge. Two clinical pharmacists and a surgical registrar collaboratively reviewed and rated all medication errors using the National Coordinating Council for Medication Error Reporting and Prevention’s (NCC MERP’s) nine-point index for categorising the severity of medication errors.

RESULTS

All patients in the observational study were well matched with no significant difference in age, sex, length of stay and number of medications. The mean difference in medication errors between the intervention group and the control group was statistically significant using the unpaired t-test. A reduction in medication errors of greater than 20% was achieved in the intervention group on both admission and discharge (see Table 1).

At admission
- 61% in the control group and 23% in the intervention group experienced one or more medication errors.
- The severity of medication errors identified in the control group ranged from a category A to category F.

At discharge
- 71% in the control group and 5% in the intervention group had one or more medication errors.
- The severity of medication errors identified in the control group ranged from category A to category F.

General
- The severity of medication errors in the admission and discharge intervention group were all rated as category A.
- Statistically significant risk factors for medication errors (P value <0.01) were age and number of medications.

DISCUSSION

The introduction of the POD system and the IDP intercepted many important adverse drug events before harm occurred. Patients enrolled in the POD system had significantly fewer admission medication errors. The system enabled doctors to obtain a more complete and accurate medication history.

The most common discharge discrepancy in the control group was a patient receiving a partial prescription. Partial discharge prescriptions can result in unintended adverse events, therapeutic duplication, and unnecessary rehospitalisation. Discharge medication errors are considered to have a greater potential for harm compared with admission errors due to the difference in monitoring of inpatient and outpatient environments.

The analysis of medication errors in each age group demonstrated that patients over 70 years of age had the largest proportion of medication errors compared with those aged less than 70 years. The study also found that the mean number of medication discrepancies increased as the number of medications per patient increased.

CONCLUSION

This study evaluated and demonstrated the need to enhance communication and improve interaction between multidisciplinary teams as patient’s transition between interfaces of care. Continued developments on these processes are necessary to improve medication safety and empower patients to become active members in their own healthcare.

REFERENCES


31. Converting patients from phenindione to acenocoumarol

U. Ashraf and S. Dobrzanski
Bradford Teaching Hospitals NHS Foundation Trust, Bradford

Winner of Hamelton poster prize (see pS7)
32. Patient opinion on cost effective generic statin switches

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Statin medications, used for lowering cholesterol levels, are among the most commonly prescribed drugs groups and as such contribute a great deal to the NHS drug bill.1 In recent years, cost saving measures have begun to play a greater part in prescribing and dispensing of medicines, and cost effective drug switching has become commonplace. This involves the switching of one prescribed drug to another that performs the same action, but costs less.

The most common switch in the statin class is between atorvastatin (£24.64 per 40mg 28-tablet pack)2 and simvastatin (£1.32 per 40mg 28-tablet pack), which is estimated to save around £200m for the NHS in five years. Patient opinion of this has rarely been sought, with one small study indicating generally positive views.3

OBJECTIVES
To evaluate the switching process for atorvastatin to simvastatin within an English primary care trust (PCT) with a focus on patient perspective.

METHOD
Project approval was granted from both LJMU and East Lancashire PCT, who were involved in selecting the seven participating G P practices. Questionnaires were devised including open, closed and Likert scale questions in order to obtain a complete patient outlook on their feelings toward their switch, the methods involved and on switching in general (Table 1).

The questionnaires were then sent along with a covering letter and a pre-paid envelope to all patients the practices had identified from an electronic record search as undergoing a switch from atorvastatin to simvastatin, in order to improve cost-effective prescribing. Address labels were supplied directly from practices, and all identifying information was lost on postage. No reminders were sent. Pharmacist telephone interviews were also carried out in order to gain a professional perspective of performing these switches, and the procedures to which they adhere.

Table 1: Views of patients about switching of statins and medicines in general

<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Missing data</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am happy being asked to switch my statin</td>
<td>23 (10.0%)</td>
<td>100 (43.7%)</td>
<td>50 (21.8%)</td>
<td>22 (9.6%)</td>
<td>34 (14.8%)</td>
<td>11</td>
</tr>
<tr>
<td>The NHS should switch medication if national guidelines advise it</td>
<td>21 (9.3%)</td>
<td>103 (45.4%)</td>
<td>67 (29.5%)</td>
<td>23 (10.1%)</td>
<td>13 (5.7%)</td>
<td>13</td>
</tr>
<tr>
<td>The NHS should switch medication if this saves tax payers’ money</td>
<td>23 (10.0%)</td>
<td>54 (23.4%)</td>
<td>41 (18.6%)</td>
<td>59 (25.5%)</td>
<td>32 (14.5%)</td>
<td>9</td>
</tr>
<tr>
<td>The community pharmacist should explain in person why medication is being switched</td>
<td>49 (21.6%)</td>
<td>59 (43.6%)</td>
<td>40 (17.6%)</td>
<td>28 (12.3%)</td>
<td>11 (4.8%)</td>
<td>13</td>
</tr>
</tbody>
</table>

Results were then recorded and analysed using SPSS v15. Written responses and comments were analysed by simple thematic analysis, as were pharmacist interviews.

RESULTS
A total of 494 questionnaires was sent out, with 240 being received, giving an overall response rate of 48.6%.

Over half of the respondents agreed they were happy with the switch (53.7%) and the manner in which it was carried out (60.1%), but fewer (32.4%) agreed they were happy to switch in order to save the NHS money.

More than half (52.9%) did not fully understand the reason behind the switch and 16.7% claimed to have experienced side effects since the switch. Recommendations from respondents were for future switches to involve a face-to-face consultation (59.8%) and for an increase in community pharmacist involvement (65.2%). By looking at free text comments made by 68 respondents, more positive views were indicated than negative. 24 patients stated they had to reverse their switch due to side effects. Pharmacists said that they experienced no issues with patient complaints, with only a few requesting more information, and usually adhered to PCT guidance in implementing switches.

DISCUSSION
Overall, while 53.7% of patients were happy to accept the change, 24% of patients were not, and 22% were not sure, suggesting there are concerns that need to be addressed.

Although most patients were happy with the manner in which switching was carried out, a number wanted more information about the drugs and the process overall. They felt that the switching process could be improved by more face to face involvement with healthcare professionals. In support of Babar et al., this could be achieved by amending current switching guidance to involve the community pharmacist in more stages of the process, as they are ideally placed to give more information to patients. The high level of respondents wanting more pharmacist involvement shows that they are seen as an underused resource.

Many patients did not understand the reason behind their switch, even though they were informed using PCT literature, in line with guidance. This suggests that these guidelines should be reviewed as they are not meeting the level of information that patients need. This change, coupled with an increase in pharmacist involvement and maximising of opportunistic promotion of the process, could help to improve patient knowledge and increase acceptance of switches.

Although national templates for identifying suitable patients and performing switches were used in this study, the number of patients who claimed to have experienced increased side effects suggests that better selection methods may be needed.

REFERENCES
1 Institute for innovation and improvement. NHS Better Care, Better Value Indicators. 2006

33. Exploring patient opinions of MURs

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There have been few published studies regarding patients’ views of medicines use reviews (MURs),4-6 even though the MUR service has grown...
over the past six years, with over one million being completed in England within the last financial year.\(^1\)

**OBJECTIVE**

To explore patient opinions and determine patient understanding of the MUR service.

**METHOD**

Semi-structured telephone interviews were conducted in February 2010 with 23 patients who had had an MUR within the previous four weeks. Patients were randomly selected from four branches of a large multiple community pharmacy chain located within a city in the East Midlands. The interviews were recorded, transcribed verbatim and content analysed.

As part of the interview patients were asked about the recommendations made to them during the MUR. This was then compared with the number of recommendations recorded by the community pharmacist. Ethics committee approval was not sought as this is a service evaluation.

**RESULTS**

All patients who were contacted by telephone agreed to be interviewed (n = 23).

Thirteen patients said they found the MUR beneficial and they were more informed about their medication as a result of the MUR. A further five patients said the MUR was reassuring as it confirmed existing knowledge of their medicines.

Seven patients stated they had a poor or minimal relationship with their GP; of whom four thought the MUR was useful: “I feel more comfortable with the pharmacist because they know me.” However, only three patients could recall all the recommendations made by the pharmacist.

Eight patients did not appear to understand the purpose of an MUR; some thought it was legal requirement, while others thought it was for the benefit of the pharmacy, not themselves. However, all but two of the patients interviewed said they would have another MUR the following year.

Although no-one expressed concern that they were being overheard, eight patients thought the consultation room was too small: “... it was an intimate sized room”; “claustrophobic”.

**DISCUSSION**

Patient reports that MURs are beneficial was less evident in this study than in previous patient studies.\(^1\)\(^-\)\(^3\) The method used may have allowed patients to be more honest as the interviewer was not involved in the MURs or with the pharmacies. Also this study is small, and these patients may have had several previous MURs so already have a good knowledge of their medicines.

This study was conducted towards the end of the financial year, so pharmacists may have been trying to achieve their target numbers and this may have impacted on the quality of the MUR.

Possible reasons for the poor patient recall of pharmacist recommendations may include the lack of reinforcement of recommendations within the consultation, their clarity and whether patients considered the advice relevant.

It would appear that a relationship with a regular pharmacist is important, which would be difficult to achieve in pharmacies that are dependent on relief or locum pharmacists. Patients may be more willing to have an MUR if they know the pharmacist well and if they are comfortable in the consultation room.

Patients’ understanding of the service could be improved either by national advertising or clearer explanations from individual pharmacists.

**REFERENCES**

2 Youssef S, Hussain S, Upton D. Do patients perceive any benefits from medicines use reviews offered to them in community pharmacies? Pharmaceutical Journal 2010; 284:165-66

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**PFIZER LTD REGIONAL PREREGISTRATION PHARMACISTS WINNING ABSTRACTS**

**A. Audit of the prescribing of therapeutic dose dalteparin against the recommendations of the NPSA**

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In July 2010 the National Patient Safety Agency (NPSA) produced a rapid response report entitled “Reducing treatment dose errors with low molecular weight heparins (LMWHs)”, in response to a review of the incident data from the National Reporting and Learning Service (NRLS). This review identified 2,716 incidents between January 2005 and September 2009 involving LMWHs, one of which resulted in death and three in severe harm to patients.\(^1\) The NPSA made a series of recommendations to improve patient safety, and the main aim of this study was to assess the compliance of City Hospitals Sunderland with three of these recommendations. In addition, the study aimed to investigate the pharmacy input required for the accurate prescribing of LMWHs.

**OBJECTIVES**

- To assess compliance with the following recommendations:\(^1\) a patient’s weight is used to calculate dose of LMWH, a patient’s renal function is considered when deciding on dose of LMWH, dosing checks based on patient information are made by healthcare professionals who review, dispense or administer LMWHs
- To assess the degree of pharmacist intervention required for accurate prescribing of dalteparin, and to investigate the documentation of these interventions.

**METHOD**

Patients were selected if they were prescribed therapeutic dose dalteparin and had had the treatment reviewed by a pharmacist. Patients were excluded if they were prescribed prophylactic dose dalteparin or if they were pregnant women.

Data was collected on 50 patients who were prescribed therapeutic dose dalteparin between 15 November and 16 December 2010. Patients were selected using the electronic prescribing system, in chronological order based on the date the drug was prescribed. Information collected included the base ward, dosing details and indication for treatment, availability of weight and renal function, and details of any documentation regarding the dalteparin treatment recorded on the pharmacy patient profile. Data was also collected on pharmacist interventions required for accurate dosing.

**RESULTS**

Most prescriptions for therapeutic dose dalteparin were on the emergency and medical directorates, with the highest incidence on the medical admissions unit. This is unsurprising as these directorates are most likely to see acute problems such as DVT and PE. They are also large directorates with a high patient turnover.

All patients in this study had their renal function monitored prior to treatment, showing 100% compliance with the NPSA recommendations. Only four patients had a severe enough renal impairment to warrant consideration of dose change and of these, 75% had changes made to their treatment. However, due to the small sample size it is impossible to draw any real conclusions around the management of renally impaired patients within the trust.

70% of patients investigated were dosed correctly based on their weight. For the purposes of this study, correct dosing was defined as patients dosed correctly according to the defined dosing bands, using an actual weight measurement. Exceptional circumstances that would prevent weighing were taken into account, such as patients who were too sick to move. In these patients dosing was deemed correct if based on a reasonable estimate. 15 patients were deemed to be dosed
incorrectly. Of these, 67% were dosed incorrectly due to an actual weight not being available. This included patients who were dosed based on an estimated weight and those patients for whom no weight was recorded. A further 27% of errors were due to miscalculation of dose, and for one patient there was ambiguity surrounding the patient's weight. Reasons for these errors may include a lack of suitable weighing equipment on the wards, lack of time to weigh patients or for pharmacists to request actual weights; and a lack of education of pharmacy and medical staff regarding the need for actual weights for dosing.

Of the patients studied, 74% had a treatment plan documented in the pharmacy paperwork, indicating that a dosage check had been carried out. In an ideal world, all changes to a patient's treatment plan should be documented, to allow for continuity and a clear audit trail. Reasons for less than 100% compliance may include remote reviewing via the electronic prescribing system, a lack of time to document changes and a lack of education with regards to the importance of documentation.

Pharmacist intervention was required in 18% of cases to ensure accurate dosing. The most common intervention was to request an actual weight. Pharmacists also intervened to change doses which were wrongly prescribed, and to discuss dosing decisions with consultants with regards to renal impairment.

**DISCUSSION**

In conclusion, the trust is close to achieving compliance with the NPSA recommendations. Weight was used to calculate the dose correctly in 70% of cases. The renal function was monitored for 100% of patients, and was considered for the dosing in 75% of those with severe renal impairment. Finally, there was evidence of pharmacists conducting dosage checks and carrying out interventions throughout the trust.

Recommendations to improve patient safety could include continuation of the work currently ongoing within the trust to improve the trust wide recommendations for weighing patients and recording measurements, which will prove invaluable for the dosing of many drugs, including dalteparin. Secondly, improving the education of medical and pharmacy staff through a combination of formal and informal interventions such as posters and presentations. Finally, pharmacists should be encouraged to document treatment plans and interventions on the pharmacy paperwork, to allow for continuity and evaluation of effectiveness of interventions made. Future audits may include a larger sample size, especially with regards to renal impairment, an in depth review of pharmacist interventions made and an investigation into the trust’s compliance with the remaining points of the NPSA Alert, including the availability of dose calculation tools and the communication of essential information at transfers of care.

**REFERENCES**


**B. An audit of the accuracy of pharmacist drug calculation skills**

**Beata Kwiatek**
Pharmacy Department, King's College Hospital NHS Foundation Trust

Improving quality and patient safety is central to the government's strategy for the NHS. The modernisation programme introduced the concept of clinical governance in 1999 and set out a consistent idea of quality improvement "by creating an environment in which clinical excellence will flourish."

Medication errors can arise during prescribing, dispensing and administering of medicines. These may harm patients and trusts are required to have systems in place to prevent errors.

Medicines use is complex, particularly when it involves injectable medicines. Calculations may be needed before doses are prescribed, prepared and administered. The National Patient Safety Agency, established in 2001, has described drug dose calculation as a key factor contributing to medication errors including 10-fold errors.

Some healthcare professionals have difficulty calculating doses. An analysis of medication errors reported locally showed that in an 18-month period 34 tenfold errors occurred. All practitioners handling medicines should be competent to calculate drug doses. Pharmacists’ training includes a 52-week structured programme followed by a registration examination in which calculation skills are tested. Once qualified, these skills are not formally reassessed. Competence of registered practitioners is assumed. This audit has been designed to confirm that pharmacists are competent in drug calculation skills in a range of clinical scenarios.

**OBJECTIVES**

1 To measure pharmacists accuracy in drug dose calculations.
2 To identify situations where 100% accuracy is not achieved and where support is needed
3 To propose a system to regularly monitor competence in drug calculation skills

**STANDARDS**

100% of pharmacists achieve 100% accuracy in a calculation test

**METHOD**

A questionnaire was designed based on a series of drug calculation skills deemed to be essential for all pharmacists. Nine senior pharmacists completed the questionnaire to validate the questions. Minor modifications were then made to two questions in the final questionnaire. All pharmacists within the trust were required to complete the questionnaire during one of a series of scheduled sessions during February when they could be relieved from their clinical commitments. A cover letter was given to each pharmacist explaining the purpose of the audit and giving responses to frequently asked questions. Completed questionnaires were returned to the investigator for marking. Results were analysed and feedback on performance was given to individual pharmacists and their line managers.

Incorrect answers were categorised as “mistakes” or “slips” by two investigators. A mistake was identified when a pharmacist showed lack of knowledge in their approach to the question and their method could not have given a correct answer. A slip was identified when a minor error had been made in an otherwise correct calculation, eg, accidentally using the patient’s weight instead of age in the Cockroft and Gault equation for creatinine clearance.

The Chi-squared test was used to compare the results between pharmacists of different bands and compare their level of competence.

**RESULTS**

Sixty-seven out of 72 pharmacists completed the questionnaire. One pharmacist did not consent for their results to be included in the analysis. Results of 66 pharmacists are presented in Tables 1 and 2.

**DISCUSSION AND CONCLUSION**

Not all pharmacists achieved 100% in the calculation accuracy assessment. Results suggest that senior pharmacists are more competent in calculations
than junior pharmacists. However statistical analysis demonstrates that it cannot be assumed that pharmacists at higher grades are more competent than other pharmacists in calculation skills. There is no statistically significant difference between the numbers of Band 6 pharmacists and the numbers of senior pharmacists who did not achieve 100% (Table 2). Although some incorrect answers were classified as slips rather than mistakes, such failures can result in the same adverse clinical outcome as knowledge based errors and their importance needs to be highlighted.

The findings of this audit have highlighted a neglected governance issue that can have a major impact on medication safety and patient care. In order to meet the standards of this audit support will be available to pharmacists to improve their calculation skills prior to reassessment.

**RECOMMENDATIONS**

The assessment will be carried out on regular basis (annually) in order to confirm competence. The test will be used to identify learning needs of new members of staff and should form part of the induction process for pharmacists joining the department. The assessment tool will be adapted for e-learning and amended for other healthcare professionals who need to be competent in drug dose calculations.

**REFERENCES**


C. Medicines reconciliation: an audit of the percentage of medical patients who had their medicines reconciled within 24 hours of admission at the Royal Glamorgan Hospital, Llantrisant

**D. Phillips and J. Hardwidge**
Royal Glamorgan Hospital, Llantrisant

Medication error is a leading cause of harm to hospital patients, resulting in increased patient morbidity, mortality and cost to the health service.\(^1\) Care interfaces, particularly admission, are responsible for over half of all medication errors. Medicines reconciliation is the process of identifying the most accurate list of a patient’s current medicines and comparing them to the most recently available information.\(^2,3\) A safety report issued by the National Patient Safety Agency (NPSA) and the National Institute for Health and Clinical Excellence (NICE) in 2007 called for the implementation of policies and work systems by health organisations, to ensure all adults have their medicines reconciled within 24 hours of admission.\(^4\) This audit measured the number of medical patients admitted, who had their medicines reconciled within 24 hours at the Royal Glamorgan Hospital, in conjunction with hospitals throughout Wales.

**OBJECTIVES**

To identify the time taken from patient admission to medicines reconciliation by a pharmacist, and to determine the provision of pharmacy services to the acute admissions unit (AMU) at the Royal Glamorgan Hospital.

**METHOD**

A retrospective analysis of all patients admitted through the acute admissions unit (AMU) at the Royal Glamorgan Hospital, completed over a two week period. Two data collection forms were used to determine patient specific data, and the provision of pharmacy services to AMU. Data was collected by the author and analysed using Microsoft Excel.

**RESULTS**

- 48% (n=136) of all patients admitted had their medicines reconciled within twenty four hours.
- Excluding patients discharged within twenty four hours, 62% (n=134) were reconciled within twenty four hours.
- Average time from admission to medicines reconciled was 27.7 hours.
- 15.5% (n=11) of patients were reconciled within twenty four hours over the weekend, compared to 60% (n=125) on weekdays.
- Provision of pharmacy services to AMU (pharmacist and pharmacy technician time) over the weekend and during the week averaged at 1.1 and 7.7 hours a day respectively.

**DISCUSSION**

The number of patients having their medicines reconciled within 24 hours of admission did not meet the standard set by the NPSA and NICE. Three key reasons were identified as to why patients’ medicines were not reconciled: the patients were discharged within 24 hours of admission, patients were admitted over weekend periods, or patients were transferred to another hospital var. Delayed medicines reconciliation, particularly over weekend period necessitates the greater provision and funding of pharmacy services. In addition, shared access of patient records between primary and secondary care would ameliorate medicines reconciliation and minimise medication error between care interfaces.

**REFERENCES**


D. A retrospective audit of pharmacist interventions on discharge prescriptions

**D. Larkin and J. Sexton (supervisor)**
Royal Liverpool University teaching hospital, Liverpool

Clinical pharmacy services can be defined as “the aspects of pharmacy practice directed at optimising patient outcomes”. This service is key to hospitals for both patient care and reduction in unnecessary drug spending. As part of clinical pharmacy, pharmacists play an important role in policies directing the discharge process for potential medication errors. They ensure that the discharge prescription matches up with the inpatient form, and that all medications are correctly written up, as well as assessing the clinical appropriateness of all prescribed medication for the patient.

At the Royal Liverpool and Broadgreen University Hospital Trust (RLBHUHT) hand-written drug charts are transcribed onto an electronic system to generate a discharge prescription. Two copies of a discharge prescription should be printed; an unauthorised copy, and an authorised copy (with pharmacist amendments, where required). Previous work audit work in the trust has shown that pharmacists need to seek clarification before completing discharge prescriptions.

**OBJECTIVE**

To assess the number of interventions made on discharge prescriptions by pharmacists, and their clinical significance.

**METHOD**

Every available discharge prescription in the dispensary during normal opening hours for five days was audited. Prescriptions were excluded if either the authorised or unauthorised copies were not available, the prescription arrived outside of normal pharmacy hours. The two copies were compared...
one another and any changes made by the checking pharmacist noted on the data collection pro-forma.

The ward producing the discharge prescription, pharmacist checking the prescription, total number of items before pharmacist intervention and whether the prescription was checked on the ward or in the dispensary were also recorded. These data were collated into a spreadsheet, and each intervention was retrospectively assigned a severity score of 1–3 based on an existing model for assessing prescribing error severity. This was validated by a second pharmacist.

RESULTS
- 387 discharge prescriptions were audited, containing 3106 items. 217 (56%) discharge prescriptions and 481 (15%) items audited received a pharmacist's amendment over the week. This equates to an average of 1.3 interventions, with an average severity score of 2.02. 20 items received more than one amendment.

- Of the 504 amendments there were: 121 (24%) severity score 3 amendments, 219 (43.5%) severity score 2 amendments, and 164 (32.5%) severity score 1 amendments.

- The acute medical unit (AMU) discharged the most patients (35, 36 prescriptions). Orthopaedics (4A) had the largest percentage of interventions by item (38 amendments, 33.6%), and by prescription (14 amendments, 90%), however, ward 9X had the highest average severity score (2.41) over 16 amendments on 26 discharge prescriptions.

- Discharge prescriptions checked on the ward had a higher mean severity score than those checked on the clinical checking desk (1.91 vs. 1.94, p = 0.017).

- 316 (81.7%) of the audited prescriptions were checked on the ward.

DISCUSSION
The results show that pharmacists have a valuable role to play in validating prescriptions. The data collected could be used to target particular cohorts of doctors that required further education in prescribing. It is worth noting, however, that many amendments were due to prescriber error; many were simple changes to directions added by the pharmacist for patient benefit (eg, PRN to pain killers).

The majority of clinical checks were performed on the ward, which was expected as policy states the ward pharmacist should complete discharge prescriptions where possible. It was also shown that the severity of the errors prevented on a ward checked prescription was higher than those on desk checked prescription. This could be due to the ward pharmacist knowing the patients, or having easier access to the notes and medication card, which makes them more likely to spot any errors.

The severity score was assessed retrospectively with little insight into the overall patient condition, which is important as the patient's co-morbidities could have affected the severity score of any given intervention.

Further work could be done to follow up on this audit. Recording the level of prescriber could indicate whether the prescribing shortcomings were due to university training or a failing of continuing professional development. Alternatively, if a training package was introduced to remedy the findings of this audit, a follow-up audit could be done to assess the impact of the education.

CONCLUSION
The audit found that over half of discharge prescriptions required at least one pharmacist intervention to make them clinically appropriate for dispensing, and that if these errors were not corrected, the consequences to the patient could vary from trivial to potentially fatal.

REFERENCES
The NPSA report revealed that to prescribe an accurate and safe dose of LMWH, all patients should have their weight, renal function recently calculated and documented, with the dose and indication, in the patients’ notes or on the prescription chart.¹

METHOD

The audit was limited to patients who were newly started on treatment doses of enoxaparin (the LMWH used at UHCW), as treatment dosing requires the patient’s weight, and a dosing calculation to be done.² The targets the NPSA had set were for 100% of patients to have their LMWH appropriately prescribed with a current weight, a recent creatinine (or eGFR), an indication, and a documented dose.¹ A proforma was created and completed by the respective ward pharmacists on cardiology and respiratory wards over a two-week period. Information required in the proforma included: (i) the hospital number, (ii) dose, (iii) indication, (iv) body weight, (v) creatinine clearance at the time, and any other relevant notes. Analysis of data was carried out using Microsoft Excel and results were compared to the standards set out by the NPSA.

RESULTS

From a sample size of 22 patients, the results (Table 1) showed:

- 100% of patients had an indication documented
- 100% of patients had a documented dose
- 70% of the patients had a weight recorded
- 95% of the patients had renal function taken into account where it was available to calculate
- 80% of the data had the correct dose prescribed according to the BNF, renal drug handbook or summary of product characteristics (SPC)

This meant that overall, prescribing was to the standard required by the NPSA in 45% of my data. In 55% of cases, there was a standard that was not met.

DISCUSSION

Based on the audit result UHCW is not meeting NPSA standards. The primary reason is because recent, exact weights are not being obtained or documented. Estimating a weight would cause an incorrect dose for enoxaparin, which can be further compounded as enoxaparin is dose-banded.² This affects the dose that may be prescribed and given; it also impacts on other aspects for example calculating an accurate creatinine clearance. The second biggest factor was incorrect dose prescribing, which included an indication for obesity, which has no evidence. Rather the SPC states if a patient is obese, ideal body weight should be used to calculate dose.¹ Renal function was not taken into account in one case where a recent weight was documented.

The results could be improved by having prompts on the ward and on the prescription chart to remind prescribers of when and how to alter doses, as well as the information needed to do so.

UHCW has now redesigned their prescription chart and included a weight input box which is more prominently displayed on the front; a re-audit should be done to see whether there is any improvement on these results.

REFERENCES


Table 1. Compliance with NPSA criteria

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Compliance</th>
<th>NPSA standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight recorded</td>
<td>70%</td>
<td>100%</td>
</tr>
<tr>
<td>Renal function considered</td>
<td>95%</td>
<td>100%</td>
</tr>
<tr>
<td>Indication</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Dose given</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Correct dose prescribed</td>
<td>45%</td>
<td>100%</td>
</tr>
<tr>
<td>Met all criteria</td>
<td>45%</td>
<td>100%</td>
</tr>
</tbody>
</table>

G. Low molecular weight heparin prescribing at University Hospitals Coventry and Warwickshire compared to NPSA standards

Girish Lakhanpal
University Hospitals Coventry and Warwickshire (UHCW)

An alert was released in July 2010 from the National Patient Safety Association (NPSA) highlighting the dangers of inaccurate low molecular weight prescribing, and the impact it can have on patient care. This came as a response to more than 2,500 incidents between January 2005 and September 2009 relating to low molecular weight heparin (LMWH) prescribing errors.¹

Table 1: Results obtained for each measured objective (all standards were set at 100%)

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Objective 1</th>
<th>Objective 2</th>
<th>Objective 3</th>
<th>Objective 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amersham</td>
<td>N/A</td>
<td>60</td>
<td>45</td>
<td>100</td>
</tr>
<tr>
<td>Stoke Mandeville</td>
<td>96</td>
<td>51</td>
<td>34</td>
<td>100</td>
</tr>
<tr>
<td>Wycombe</td>
<td>84</td>
<td>36</td>
<td>29</td>
<td>96</td>
</tr>
<tr>
<td>Cumulative</td>
<td>96</td>
<td>48</td>
<td>33</td>
<td>99</td>
</tr>
</tbody>
</table>

Results obtained for objectives 2 and 3 fall far short of the standard. This shows that the trust needs to raise awareness of the importance of the completion of the ‘received by’ section. From interactions with the nursing staff during data collection, there seems to be a lack of awareness of the existence of this section in the CD order book. Those aware seemed under the impression that they could either sign the SDF or the ‘received by’ section where they should be signing both.

Also, the SOP as at the time of audit did not state that only persons in the authorised signatory list are to sign the received by section. This was the major limitation to this audit and may explain the very poor result obtained against objective 3. For this reason, one of the recommendations made was that the SOP be reviewed and a basic package on receipt of ward CD included in mandatory training for all nurses and operating department practitioners. The lack of SDFs in Amersham could explain why in the individual results, Amersham achieved the highest results for objectives 2 and 3. It has also been recommended that the use of SDF be reviewed and abolished if possible as it adds another step in the process and increases chances of error.

The receipt of non-Schedule 2 CDs, which do not require entries to be made in the CD register, was taken into account for objective 4. CD register entries are a legal requirement and a result less than 100% as obtained in this case is cause for concern. This was observed in only one of the hospitals and investigated immediately. On two of the three occasions, the drugs were found in the CD cupboards and the nurses were advised to make the entries. The third order could not be investigated due to a lack of nursing staff; however, the lead pharmacists for all three wards were informed and the cases followed up accordingly.

In conclusion, the results obtained across the trust show that practice can be improved on all wards in all three acute hospitals. The number of orders checked generated sufficient data for reliable deductions. However, the process was tedious and time consuming. The objectives of this audit were fully met and recommendations made as appropriate. The onus lies on pharmacy staff and nurses to implement the recommendations of this audit.

REFERENCES

2 Jenkins T. Buckinghamshire Healthcare Standard Operating Procedure for Supplying and Transporting Controlled Drugs to wards and other users from the Pharmacy Department, Authorised by Quinn J, Chief Pharmacist, 2007.
3 Jenkins T. Buckinghamshire Healthcare standard operating procedure for records of Controlled Drugs receipts and administration on wards and in departments, Authorised by Quinn J, Chief Pharmacist, 2007.
H. Availability of antidotes within the BHSCT

Hannah Lübbeke
Royal Victoria Hospital, Belfast

The “Guidelines on antidote availability for emergency departments” were first issued by the BAEEM Clinical Effectiveness Committee in May 2006. When uptake and compliance of these guidelines was determined, it showed that although well received with a general improvement in antidote stocking, there was still poor availability of others.1 As a result, a College of Emergency Medicine working group was convened to review and update the guidelines, which became available in May 2008.2,3

It was highlighted by discussion with the Emergency Department pharmacist that there was a need to produce an accurate list of antidote holdings within the Belfast Health and Social Care Trust and to review them in light of the guidance issued by the CEM.

OBJECTIVES

- To produce an updated list of antidote holdings in the BHSCT and use it to review accordance with the guidelines
- To highlight and discrepancies in stock holdings and also to ensure that all the antidotes available are within their expiry date
- To produce a database as a resource for healthcare professionals nationwide, highlighting the antidotes available from the BHSCT, made available on TOXBASE

METHOD

An audit was carried out regionally to determine the antidote holdings for all of the BHSCT trust hospitals, within the pharmacy and the emergency departments. Data were obtained using the JAC dispensing system and by observation between 29 October and 29 November 2010.

A concise list of all BHSCT antidotes was produced, and uploaded to TOXBASE online.

RESULTS

It was found that many of the antidotes recommended in the guidance were held at each location. However, 65% of the antidotes were only available at some of the locations within the trust and 13% were not available at all.

Of the antidotes that were held within the trust, only 16% were present at or above the recommended stock, in the emergency department. Five of these were antidotes that should be immediately available in the emergency department.

The antidotes that should be held supraregionally were not reviewed with regards to the guidance as they are not required to be on site and also as no stock recommendations exist.

DISCUSSION

It became clear that there is a requirement for increased stocking of antidotes as outlined by the CEM guidelines and there is a need to ensure standardisation of guidelines used, as some hospitals were previously using older guidance.

Recommendations were made to the individual departments regarding need for increased stock holdings. Additionally, the TOXBASE resource was made available online and expanded to incorporate availability within other Northern Ireland trusts.

I. A retrospective clinical audit to determine the quality of the pharmacist-led liver transplant assessment vaccination programme at Addenbrooke’s Hospital

J. Robinson and A. Eggleton
Addenbrooke’s Hospital, Cambridge

Addenbrooke’s Hospital is one of the main liver transplant units in the UK and was responsible for carrying out 78 liver transplantations during 2009–10.1 Donated livers are a finite NHS resource so liver transplant assessments (LTA) are used to determine a patient’s relative clinical need and suitability for a transplant.

The Department of Health’s (DoH) publication, ‘The Green Book’, recommends that patients with chronic liver disease should be routinely immunised against hepatitis A and B, influenza and Pneumococcus.2 To ensure that the DoH recommendations are being followed, a prescribing pharmacist at Addenbrooke’s Hospital developed a clinical management plan (CMP) in April 2010. The CMP allows certain vaccines, against the above pathogens, to be prescribed by supplementary prescribing pharmacists. The CMP is being routinely implemented as part of the new pharmacist-led LTA service.

During the LTA, patients are initiated on vaccination programmes against hepatitis A/B according to their immune status. Following patient discharge, letters are sent to patients’ GPs requesting continuation of the vaccination programme (ie, requesting the necessary second, third and fourth doses of the vaccines).

Adherence to the CMP is vital to ensure that all LTA patients are initiated and continued on the correct vaccination programmes prior to transplantation. Non-adherence to the CMP could result in damage to a newly transplanted liver by preventable infections, which could ultimately waste NHS resources and put the patient at risk. It was essential that the quality of the service was audited as it is new to the trust.

OBJECTIVES

1 To ascertain the level of adherence to the CMP during the supplementary prescribing of vaccines for patients who have undergone a LTA
2 To determine the quality of the information contained within the letters that are sent to the patients’ GPs requesting continuation of the vaccination programme.
3 To ascertain the level of adherence to the requested vaccination programme by the GP/healthcare provider, following patient discharge.

METHOD

Data were obtained for 20 patients who were prescribed vaccines by a pharmacist prescriber during a LTA and who were on the liver transplant waiting list at the time of data collection (7 January 2011). The data collected included patient details, immune status against hepatitis A/B, details of the vaccines prescribed during the LTA, CMP details, details of medical note entries, information contained within the GP letters and details of the vaccines given by the GPs/healthcare providers following patient discharge.

RESULTS

The audit sample consisted of 11 men and nine women with a mean age of 59 years. Table 1 summarises the percentage adherence to each audit standard and the main reason for non-adherence, if any. More detailed audit standards are available upon request.

DISCUSSION

Results indicate that the quality and clinical appropriateness of vaccine prescribing during the LTAs was of a high standard and was carried out in
J. An audit of intravenous infusion prescribing and dose/rate calculations on ITU

Lavina Selina David (supervisors: I Kasmani, B O’Farrell)
Royal Free Hampstead NHS Trust

There is evidence that the incidence of errors in prescribing, preparing and administering of injectable medicines, is higher than for other forms of medicine.1–3 ICU patients are particularly susceptible to these errors as not only do they receive more medication than other patients on general wards but the complexity of dosing and monitoring of high risk medication, increases the risk of errors.1 Most medications in the ICU are given intravenously, and calculation of infusion rates is often required.1 Common errors identified, and discussed in the literature, include incorrect dose calculation and subsequent failure to set and monitor IV pumps correctly.1

The Department of Health has placed much emphasis on patient safety and one of the action points for healthcare organisations, in patient safety alert 20 “promoting safer use of injectable medicines”, is auditing medication practice with injectable medicines as part of the annual medicines management audit programme.4 The critical care pharmacists have therefore initiated the following audit in compliance with this action point, and to identify potential problem areas and where risks may be reduced.

AIMS AND OBJECTIVES

The primary objective was to verify that the doses recorded on the ICU observation chart by the nurse for IV infusions are calculated correctly and that they correspond to the prescription written by the doctor. Syringe labeling practices were also audited against in-house syringe labelling standards.

STANDARDS

1. 100% of the doses recorded on the observation chart should correspond to the rate the infusion is running at and to the prescription.
2. 100% of the drugs prepared for infusion should be labelled correctly according to in-house standards.

METHOD

A data collection sheet was used to record information from the observation chart, syringe pumps, and prescription charts, along with information from the labels of each drug being infused. Data was collected for five days from Monday to Friday for approximately three hours each day. Data from the pumps, observation charts and the infusion prescription was collected to verify that the drug calculation was correct. Data from the label on the syringe or bag was collected to verify that the label had been correctly prepared according to the in-house standards. This information was then entered on an Excel spreadsheet for further analysis.

RESULTS

1. Seven out of 200 pump infusion rates did not match the calculated rate, and therefore did not reflect the dose recorded on the observation chart. 96.5% of the pumps were set at a rate that reflected the dose recorded on the observation chart.
2. Although all the drugs were labelled, information that was missing on some labels included the concentration, two signatures, date of preparation, or time of preparation (see Figure 1). 61 of the 197 drugs labelled could not be read without the need to stop the infusion. This resulted in 69% of all the infusions being labelled in a manner that allowed the information on the labels to be read without manipulating the device and stopping the infusion.

Table 1: Percentage adherence to audit standards

<table>
<thead>
<tr>
<th>Audit standard</th>
<th>Adherence (95% CI)</th>
<th>Main reason for non-adherence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 100% of patients should be prescribed a vaccine against hepatitis A (Twinrix or Havrix Monodose), with exceptions (n=20)</td>
<td>100%</td>
<td>—</td>
</tr>
<tr>
<td>2 100% of patients should be prescribed a vaccine against Hepatitis B (Twinrix or Engerix B), with exceptions (n=20)</td>
<td>100%</td>
<td>—</td>
</tr>
<tr>
<td>3 All patients should be prescribed the vaccine Pneumovax II if they do not recall having it before, with exceptions (n=20)</td>
<td>100%</td>
<td>—</td>
</tr>
<tr>
<td>4 Vaccinations should be administered via the most clinically appropriate route to all patients (100%) (n=20)</td>
<td>100%</td>
<td>—</td>
</tr>
<tr>
<td>5 100% of patients should be prescribed subsequent doses of Twinrix and Engerix B if they remain an inpatient, with exceptions (n=20)</td>
<td>100%</td>
<td>—</td>
</tr>
<tr>
<td>6 All drug charts (100%) should contain the required particulars (n=20)</td>
<td>95±9.6%</td>
<td>Absence of prescriber’s bleep number</td>
</tr>
<tr>
<td>7 100% of patients’ medical notes should contain a record made by the pharmacist which contains the required particulars (n=20)</td>
<td>75±19.0%</td>
<td>Errors in the dates when vaccines due</td>
</tr>
<tr>
<td>8 100% of the clinical management plans (CMP) should be completed appropriately (n=19)</td>
<td>79±18.3%</td>
<td>Absence of patient’s allergy status</td>
</tr>
<tr>
<td>9 100% of patients’ medical notes should contain a copy of the clinical management plan (n=19)</td>
<td>95±9.6%</td>
<td>Absence of CMP in notes</td>
</tr>
<tr>
<td>10 100% of patients’ electronic medical records should contain details of the vaccines prescribed (n=20)</td>
<td>80±17.5%</td>
<td>Absence of vaccines prescribed in patients’ EMRs</td>
</tr>
<tr>
<td>11 100% of the patients’ GPs should receive a letter that requests continuation of the appropriate vaccination programme and a request for the annual influenza vaccination to be given (n=18)</td>
<td>0%</td>
<td>Failure of GP letters to request annual influenza vaccination</td>
</tr>
<tr>
<td>12 100% of LTA patients should be continued on the vaccination programme listed in the clinical management plan by their GP, with exceptions (n=20)</td>
<td>45±21.8%</td>
<td>Doses of vaccines given earlier/ later than specified in the CMP</td>
</tr>
</tbody>
</table>

REFERENCES

DISCUSSION AND CONCLUSION

1 Although the first standard was not met, only 3.5% of the pumps were set at a rate that did not reflect the dose recorded on the observation chart, and on further inspection there were logical explanations for the discrepancies. The infusion rates of some of these drugs had, according to nurse looking after the patient, only just been adjusted as per the patient’s requirements. Although the dose on the observation chart had not been altered, they were annotated with an arrow on the chart showing an “increase” or “decrease” in the dose. On further discussion with nursing staff, the new rate/dose would be written in the space for the following hour (the observation chart is divided into hourly increments). All of these doses still fell within the prescribed range in spite of not reflecting the exact dose on the observation chart.

One of these seven that did not conform was for an infusion of NAC. The prescription had just been changed but the bag was still running at the rate and dose recorded on the observation chart according to the previous prescription. This was amended but highlighted the potential for error, when the dose prescription is changed after the nurse has already transcribed the doses on observation charts. The intravenous drug administration policy and procedures outlines the roles of practitioners and includes communicating any changes to prescriptions to nursing staff.

2 The intravenous drug administration policy and procedures clearly outlines all the information that should be included on labels for drugs prepared for infusion. However, Figure 1 shows that the concentration, two signatures, date and time of preparation were omitted from some labels. Only 69% of all the infusions were labelled in a manner that allowed the information on the labels to be read without manipulating the device and stopping the infusion. This posed a problem in hand-overs, and checks from senior staff, or pharmacists, as it is usually not appropriate or convenient to stop a pump. The “correct” way to attach labels to syringes was clearly demonstrated. Both of these issues could be highlighted in refresher and induction training for nursing staff.

REFERENCES


K. An audit of missed and delayed administration of critical medicines

L. A. J. O’Sullivan
Poole Hospital NHS Foundation Trust, Poole

In hospital, medicine doses can be omitted or delayed for a variety of reasons, often without consequence, but certain groups of medicine have the potential to cause harm to a patient if they are not given on time, such as anticoagulants, anti-infectives and other critical medicines. A National Patient Safety Agency rapid response report issued in February 2010 highlighted this issue and called for healthcare organisations to implement processes to reduce this risk.

OBJECTIVES

This audit aims to improve patient safety by ensuring the timely administration of medicines:

- To determine whether procedures for the administration of medicines are being followed
- To review the reasons why doses have been missed or delayed
- To assess the level of risk involved for missed doses
- To implement changes in practice if necessary

METHOD

The audit standards shown in Table 1 were adapted from Poole Hospital medicines management policy. Criteria 1 and 2 included critical medicines classified as red or amber on a UKMi critical medicines list. Criterion 3 included all prescribed medicines.

Doses were classified as omitted if they were not administered within two hours of the prescribed time. The audit looked at all medicines that were prescribed in the seven days prior to the day of audit. Patient and prescription details were recorded for each prescribed critical medicine, and information relating to the time and reason for each omitted dose was also recorded. The drug chart was searched for any incidents where two or more consecutive missed doses had occurred. The audit took place over 20 days between February and March 2011.

RESULTS

259 adult inpatients on 17 wards were prescribed 647 critical medicines. There were 145 missed doses for 96 critical medicines. Consecutive missed doses requiring AIRS forms were identified for 35 critical (red and amber) and 27 non-critical (green) medicines. The results set out in Table 2 show that the audit standards were not met for most criteria.

DISCUSSION

About 15% of critical medicines prescribed had at least one omitted dose. The leading cause of missed doses was stock unavailability (44% of all missed doses). This included drugs that are routinely kept as stock on the wards. Although the pharmacy can be contacted and technicians regularly visit these wards, delivery of stock can take several hours. A drug stock locator is available online to help nurses obtain medicines when the pharmacy is closed, but needs greater publicity. Sundays have the highest rate of missed doses of critical medicines, the day when the pharmacy is shut. Procedures are in place to obtain stock such as the emergency drug cupboard or an online drug stock locator, but these are not well publicised and some staff may not properly understand their use.

The audit identified 62 cases where at least two consecutive doses had been missed, and current policy requires an AIRS form to be submitted. In fact zero AIRS forms were completed, illustrating the problem of under-reporting identified by the NPSA. Blank spaces on drug charts were found for 31% of “missed doses”, and delayed administration was rarely recorded. This may lead to situations of over or under-dosing. The results also underestimated the true level of omissions, as follow-up work has indicated critical medicines to account for only 10% of total omitted doses.

Table 1: Audit standards, targets and acceptable risk levels

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Target</th>
<th>Target risk level</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Medicines are administered within two hours of prescribed time</td>
<td>100%</td>
<td>Clinical</td>
<td>(a) 90% Red</td>
</tr>
<tr>
<td>2 Where a dose has been missed the reason why has been documented</td>
<td>100%</td>
<td>None</td>
<td>90%</td>
</tr>
<tr>
<td>3 An AIRS form is completed where two or more consecutive doses have been missed</td>
<td>100%</td>
<td>Clinical</td>
<td>80%</td>
</tr>
</tbody>
</table>

Table 2: Results for the audit standards

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Target</th>
<th>Target risk level</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Administered within two hours</td>
<td>100%</td>
<td>(a) 90% red</td>
<td>86.8%</td>
</tr>
<tr>
<td>2 Record of omission on drug chart</td>
<td>100%</td>
<td>(b) 80% amber</td>
<td>60.6%</td>
</tr>
<tr>
<td>3 AIRS form completed</td>
<td>100%</td>
<td>80%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
Circulate an updated medicines management policy to include advice on missed and delayed doses and reporting of incidents.

Develop a list of "critical medicines" where timeliness of administration is of high importance.

Review and improve procedures for documenting omissions or delays on drug charts.

Encourage the reporting of missed doses by AIRS forms through staff education.

Determine ideal ward stock levels and review in response to frequent missed doses.

Refine and implement ordering/supply processes of critical and non-critical medicines.

Review processes for the preparation and administration of intravenous and critical medicines.

The audit standards were not met for most of the criteria and this highlights the need to improve recording and reporting of medication errors. Reporting these events and learning from them provides opportunities to improve work systems and patient outcomes.

REFERENCES

L. An audit of clozapine use in an assertive outreach team
L. Hand and S. Bassi
Sherwood Forest Hospitals NHS Foundation Trust, Sutton-in-Ashfield

Clozapine was the first atypical antipsychotic available to treat schizophrenia. However, it was withdrawn from the market in the 1970s due to cases of agranulocytosis. Clozapine was relaunched, with the requirement of regular blood tests, after studies demonstrated superior efficacy in patients with treatment resistant schizophrenia (TRS). TRS is described as treatment resistant schizophrenia. Of these, 18 (66%) had been "offered" clozapine.

Audit criteria: Patients with TRS should be offered clozapine.
Target standard: 100%, no exceptions.

OBJECTIVES
1. To determine whether clozapine has been offered to all patients with TRS, who are managed by Mansfield and Ashfield A.O., as per NICE CG82.
2. To explore reasons why patients with TRS are not offered or treated with clozapine.

METHOD
The inclusion criteria were all patients under the care of the Mansfield and Ashfield AO team with a formal diagnosis of TRS. Patients "offered" clozapine were defined as those with current clozapine treatment, past clozapine treatment or where there was evidence of a discussion with the patient about clozapine with a decision not to proceed to treatment. Current drug treatment was recorded from community prescription cards and by questioning care co-ordinators. To identify whether clozapine had been trialed in the past, or discussed with the patient, case notes were searched and a questionnaire was issued to the care co-ordinators. The questionnaire was also used to identify reasons why clozapine was not considered suitable for individual patients.

RESULTS
As can be seen from Table 1, a total of 27 patients were identified as having treatment resistant schizophrenia. Of these, 18 (66%) had been "offered" clozapine treatment as shown by either current or past clozapine treatment, or evidence of a discussion with the patient and a decision not to proceed to treatment.

For patients not offered clozapine (n=9), results from the questionnaires identified the majority of patients were not willing to take oral medicines (n=7) or have regular blood tests (n=7). Other barriers identified were amphetamine drug use (n=2) and lack of symptoms (n=1).

DISCUSSION
The results show that clozapine is not being offered to all patients with TRS. Concern regarding concordance with oral medications and blood tests are the main reasons cited as to why clozapine is not offered. Poor concordance can lead to relapse of schizophrenia as well as frequent admissions to hospital for dose titration and the risk of seizures when clozapine is restarted at the original dose. Assertive outreach patients are typically difficult to engage and often have chaotic lifestyles and lack of insight into their illness. Therefore, these findings may be a reflection of the type of patients being managed by the AO team. However, concordance can change over time so

<p>| Table 1: Number of patients with TRS, managed by AO, who have been &quot;offered&quot; clozapine |
|---------------------------------|------------------|</p>
<table>
<thead>
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<th>Number of patients</th>
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<tbody>
<tr>
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</tr>
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</tr>
<tr>
<td>Total &quot;offered&quot; clozapine</td>
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<tr>
<td>Total not &quot;offered&quot; clozapine</td>
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<p>| Table 2: Suggested recommendations and timeframes for implementation |
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<tr>
<th>Recommendations</th>
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<tbody>
<tr>
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 Audiocast an updated medicines management policy to include advice on missed and delayed doses and reporting of incidents.

 Review and improve procedures for documenting omissions or delays on drug charts.

 Encourage the reporting of missed doses by AIRS forms through staff education.

 Determine ideal ward stock levels and review in response to frequent missed doses.

 Refine and implement ordering/supply processes of critical and non-critical medicines.

 Review processes for the preparation and administration of intravenous and critical medicines.

 The audit standards were not met for most of the criteria and this highlights the need to improve recording and reporting of medication errors. Reporting these events and learning from them provides opportunities to improve work systems and patient outcomes.

 REFERENCES

 L. Hand and S. Bassi
 Sherwood Forest Hospitals NHS Foundation Trust, Sutton-in-Ashfield

 Clozapine was the first atypical antipsychotic available to treat schizophrenia. However, it was withdrawn from the market in the 1970s due to cases of agranulocytosis. Clozapine was relaunched, with the requirement of regular blood tests, after studies demonstrated superior efficacy in patients with treatment resistant schizophrenia (TRS). TRS is described as treatment resistant schizophrenia. Of these, 18 (66%) had been "offered" clozapine.

 Audit criteria: Patients with TRS should be offered clozapine.
 Target standard: 100%, no exceptions.

 METHODS
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these patients should be reassessed regularly for clozapine suitability. After a patient has been assessed for clozapine treatment, currently there are no systems and guidance in place in the Nottinghamshire region for the initiation of clozapine in the community. Therefore, this is another barrier to clozapine treatment that needs to be taken into account. Table 2 shows recommendations that could be put in place to achieve the target standard.

Several limitations of this audit need to be taken into account. Information gathered from the questionnaires is subjective and dependent upon accurate recall by the care co-ordinators. Therefore, information was confirmed using case notes and on three occasions contradicted the questionnaires. Employing case notes also had limitations as the information obtained was reliant upon all discussions being recorded accurately, and upon legible handwriting. Also, it is interesting to note that this study included patients who used illicit drugs, and this patient population has been excluded in most studies that have tested the efficacy of clozapine compared to other antipsychotics in TRS.

REFERENCES


M. Re-audit of anticoagulation discharge summaries at Southampton University Hospitals Trust

V. Collins and S. Millen

Southampton University Hospitals Trust, Southampton

In March 2007 the National Patient Safety Agency (NPSA) issued an alert regarding anticoagulation and its documentation,1 because anticoagulants are one of the classes of medicines most frequently identified as causing preventable harm and admission to hospital.2-3 Managing the risks associated with anticoagulants can reduce the chance of patients being harmed in the future.

The NPSA recommended that NHS organisations should audit anticoagulant services, therefore Southampton University Hospitals Trust (SUHT) completed an audit in 2008. Conclusions of the 2008 audit identified an extensive problem with anticoagulation charts reaching GP surgeries on discharge from SUHT, and the small percentage that were received were either incomplete or delayed. This highlights the problem of transferring information across the primary and secondary care interface.

An action from this audit was to implement a compulsory field on the electronic discharge summary that prompted prescribers to complete information regarding warfarin treatment. A re-audit was also proposed after six months.

OBJECTIVES

- To review 100 electronic discharge summaries including warfarin, during September 2010, to assess appropriate completion of the anticoagulation fields
- To compare the results with the previous data set to ascertain if the information provided to GPs has improved since the last audit in 2008
- To confirm that SUHT conform to standards set out by the NPSA patient safety alert 18 on warfarin
- To identify areas within SUHT which do not comply and to offer recommendations for improvement

METHOD

The trust’s e-documents discharge system was used to identify 100 patients as having been discharged from SUHT on warfarin during September 2010. To gain full co-operation in completing the audit the chief executive of the local medical council in Winchester was contacted, to gain his approval for the re-audit. To further support communication a presentation was made at a GP task group meeting at Southampton City PCT, highlighting the need for a re-audit and the support needed from local GPs. An online audit proforma was generated using SNAP audit software. This was then emailed direct to GP surgeries where they were asked to complete the tool once for each patient. The results were then submitted and received into an account at SUHT, where they were analysed manually.

RESULTS

Demographics: 100 patients were reviewed. Of these, a total of 66 responses were received. Of these 66 responses only two indicated that no discharge summary was received and therefore n=64.

Timeliness: 15% (10) were received within 24 hours of discharge. As hospital policy states that the summary should be received within 24 hours, these results are within breach of this with 39% (25) being received between three and seven days post-discharge.

Completion of anticoagulation information: 66% (4/4) did not have the anticoagulation drug status section completed in full.

Quality of information: 73% of GP’s felt that the discharge summary provided enough information for them to manage the ongoing anticoagulation of their patients. In the majority of cases (69%) it was clearly indicated who was expected to manage ongoing anticoagulation of the patient. However in 31% of cases the auditor appeared unclear as to whether it was their responsibility to manage the patient’s anticoagulation or the responsibility remained with secondary care.

DISCUSSION

Overall, the results from this audit demonstrate that practice at SUHT concerning the information GPs receive about patients discharged on warfarin has greatly improved. Out of the 66 cases audited, there were only two (3%) where no discharge summary was received. Equally, of the 64 cases where a discharge summary was received 94% (60/64) had the anticoagulation drug status section correctly filled in for each patient. This represents a dramatic improvement on the 2008 audit where only 21% of discharge summaries indicated that the patient was anticoagulated on discharge and only 38% (3/8) GP practices received anticoagulation charts.

Implementation of electronic discharge and the compulsory anticoagulation drug status field that must be completed when prescribing warfarin on a discharge document is identified as the main reason for improvement in discharge information from SUHT. The upgrade in documentation relating to warfarin on discharge summaries meant that of the 66 cases audited, there were no readmissions to hospital as a result of an anticoagulation error. This is also an advance on the last audit where three readmissions occurred due to an anticoagulation error, where no anticoagulation chart was received by the GP.

An area of concern is the timeliness of the discharge summary reaching the GP surgery. In order to better facilitate the discharge process SUHT IT department have been working in collaboration with Southampton City and Hampshire PCTs to encourage GP surgeries to upgrade their systems to the technical specifications required to receive e-document discharge summaries on-line. Once the GP surgeries have the capacity to receive electronic summaries, in line with the local PCT plan, they will receive each discharge summary electronically within six hours. However, currently only 30 GP surgeries have the capacity to receive electronic summaries and so the delays seen in this audit could be as a consequence of this process challenge.

The results show vast improvement overall but a re-audit of the transfer of discharge summaries to GP practices will need to be reviewed once all practices can receive them electronically.

REFERENCES