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AUDIT PAPER

# Medicines management audit cycle, St. Brigid's Hospital Ballinasloe

**R. Murphy[1,*], G. Grehan[2], V. Hays[2], G. Freeman[2], P. Kerr[2] and S. Fahy[2]**

[1] *Department of Psychiatry, National University of Ireland Galway, Galway, Ireland*
[2] *Health Service Executive, East Galway Mental Health Services, Ballinalsoe, Co. Galway, Ireland*

**Objectives.** This audit cycle aimed to identify deficiencies in medicines management in an adult psychiatric hospital. The original audit in 2009 highlighted that a number of improvements were needed to enhance prescribing standards. Following implementation of these recommendations, two reaudits were performed to assess both the improvements in medicines management along with evaluating the newly introduced drug prescription chart.

**Methods.** Local, national and international guidelines on medicines management were reviewed in 2009, following which an audit tool was designed. Recommendations from the original audit were taken on board with the introduction of a new medication chart. This chart incorporated many of the recommendations from the original audit into it. Two reaudits were then performed, each over 1 day by four assessors and included all inpatient wards.

**Results.** The initial audit in 2009 outlined a number of recommendations, namely the introduction of an appropriate 'fit for purpose' medication chart, the need for regular postgraduate prescribing education and training and the consideration of a prescribing formulary and/or Drugs & Therapeutics Committee. Results from the reaudits revealed that considerable improvement was made in areas such as patient demographics, pharmacist involvement, generic prescribing, BLOCK capitals, inclusion of Medical Council Registration Number, PRN prescribing and discontinuation procedures.

**Conclusion.** Although significant improvement was noted, further improvement is required with regards to the need for a review date for PRN medication; the need for improved documentation of allergies, height and weight; and the importance of a working group to assess community medicines management and the need for further reaudits to assess continued improvement in all deficient areas.

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**Key words:** Adverse drug reactions, drug errors, guidelines, medication chart, medicines management.

## Introduction

Medicines management encompasses the inclusive way that medicines are selected, procured, delivered, prescribed, administered and reviewed to optimize the contribution that medicines make to produce informed and desired outcomes of patient care through multi-disciplinary collaborative working (Simpson, 2001). The prescribing of medicines is integral in the provision of healthcare as it represents a safe, effective and inexpensive mode of treatment (Audit Commission, 1994). Psychotropic medications are among those most commonly prescribed in modern clinical practice, and research indicates that it is the most commonly prescribed drugs that most often contribute to adverse drug reactions (DTP, 2000). The matter of adverse drug events incorporates the issues of suboptimal prescribing, poor patient adherence to medication regimes, adverse drug reactions and interactions, medication administration errors and inadequate interdisciplinary communication across multiple health service interfaces. Adverse events often occur as a result of failure at one or more levels of the medicines management system from the initial prescribing decision, recording of the medication order, communication and review of the medication order, provision of medicines information followed by dispensing, administration and monitoring of the prescribed agents (Bell *et al.* 2004; Stowasser *et al.* 2004). Improving safety with regard to medicines management to minimize iatrogenic patient injury has become a priority for health services [Smith, 2004; Health Information and Quality Authority (HIQA), 2008] as adverse drug events are a frequent reason for clinical negligence litigation, are a significant cause of patient morbidity and mortality, and are reported to be the commonest preventable cause of patient injury (National Medicines Information Centre, 2001).

Medication safety research to date has been primarily concentrated on addressing preventable adverse drug events, specifically prescribing and transcribing errors (Kohn *et al.* 1999), with the number of medication orders being directly proportional to preventable adverse events (Dequito *et al.* 2011). In the United Kingdom, prescribers

* Address for correspondence: R. Murphy, Department of Psychiatry, National University of Ireland Galway, Galway, Ireland.
(Email: ruthannmurphy1@gmail.com)

make errors in 1.5% of prescriptions with junior doctors reported to be responsible for 91% of prescribing errors, 39% of errors originating in the prescribing decision and 61% in the medication order writing (Dean, 2002). Excessive dependence on memory, deficiency of standardization, insufficient information accessibility and substandard work schedules, all create situations where individuals are more likely to make mistakes (Reason, 2000). In all, 43% of errors were mistakes of violations with the highest error rate identified for new medication orders written during the inpatient stay. However, it is clear that this level of prescriber is not likely responsible for all prescribing decisions, with the majority of errors here knowledge based and therefore potentially addressable through educational interventions (Dean, 2002).

Medication errors can also lead to potential economic consequences as a direct cause of hospital admissions, through extended hospital stay (which has been estimated at €55 million by the Irish Healthcare Risk Management Association in 2002), increased litigation and potential financial reimbursement if patients are significantly injured. American figures published in 2000 revealed adverse drug reactions were the leading cause of death, owing to an estimated 100 000 deaths each year, an approximate rate of serious medication error of 7% (Weingart *et al.* 2000) and an average cost of $5.6 million/year for a 700-bed teaching hospital (Rybackii, 1997). A UK-based study in 2004 revealed that adverse drug reactions were responsible for 6.5% of hospital admissions and a projected annual cost of £244 million (Pirmohamed *et al.* 2004). There is also potential for reduction in patient trust and satisfaction with healthcare provision, ultimately resulting in erratic or non-compliance with prescribed medication (MDU, 1996; MPS, 1999).

## Audit

National guidelines published from the Mental Health Commission (2008), the HIQA (2008), An Bord Altranais (2007) and the The Pharmaceutical Society of Ireland (2008), along with local guidelines from the East Galway Mental Health Services Audit Committee (2007) were reviewed before development of an audit tool. All outlined the importance of multidisciplinary team input in the development and implementation of new prescribing guidelines, the need for discontinuation of the traditional card index prescription sheet followed by the introduction of a more comprehensive drug prescription sheet, the importance of continued prescribing training for non-consultant hospital doctors (NCHDs) and the importance of adequate recording of patient demographics for all drug prescription charts (DPCs). The Irish Medical Council Guidelines for Professional Conduct and Ethics (Irish Medical Council, 2009) incorporated the standard for inclusion of Medical Council Registration Numbers (MCRN) aside prescriber signatures. International guidelines for medicines management (Miller *et al.* 2008; Keogh, 2011) provided further guidance on global standards, which proved vital not only in the development of the audit tool but also in the subsequent development of the new DPC. The initial audit was carried out in 2009 over one afternoon with four assessors and included 36 adult DPCs.

The issues identified from this initial audit and its outcomes included the following:

| Issue | Recommendation |
|---|---|
| Current DPC | Need to discontinue current card index system of prescribing with replacement of a 'fit for purpose' medication chart to include residents' name, date of birth, name of ward, specific STAT/PRN/ pharmacy section |
| Prescribing education and training | Need for continued medical, nursing and pharmacy prescribing education and training in line with national guidelines (inclusion of MCRN, generic prescribing) |
| Pharmacy involvement | Ensure inclusion of pharmacist in clinical ward meetings/ multidisciplinary meetings |
| Future medicines management | Development of a Drugs & Therapeutics Committee and/or medication prescribing formulary |

## Intervention

Recommendations from the initial audit in 2009 were implemented with the introduction of a new DPC in June 2011. The Drugs & Therapeutics Committee was reconvened in January 2010, meeting on a bimonthly basis with further revision of the East Galway Mental Health Services Policy on Medicines Management occurring in 2011. The Pharmacy department began to regularly attend clinical ward and multidisciplinary meetings with subsequent development of a prescribing formulary. Emphasis was placed on biannual induction training of medical and nursing staff with regards to local, national and international prescribing standards and continued education.

## Reaudit

The rationale of the reaudit in 2011 was to further assess compliance to the standards outlined in the initial audit of 2009, while also evaluating the newly introduced

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medication chart. The audit tool used for the reaudit in 2011 was very similar to the original version used in 2009, but questions relating to PRN, STAT and pharmacy sections, as well as the presence of one complete prescription chart were all compliant to 100% as the introduction of the new 'fit for purpose' DPC ensured full compliance with these parameters, as it included all such sections as standard. There was an initial meeting of the four members of the audit team who compared their answers for all questions with regards to one DPC to achieve a consensus about the interpretation of the questions. Data were entered onto a Microsoft Excel spreadsheet and results coded as Yes = 1, No = 2 and N/A = 3. If there was an error in one area of medication chart, that error was documented as Yes for the entire DPC, that is, each prescription chart needed only one error for documentation of a failed standard. Analysis carried out on results looked at percentage compliance with standards. The standard agreed was for 100% for all criteria. The reaudit was carried out in November 2011 over one afternoon and included 45 adult DPCs in the three wards of the hospital, St. Lukes Ward (11 patients), St. Dympnas Ward (19 patients) and Clonfert Ward (15 patients). A further reaudit took place in November 2012 over one afternoon and included 30 adult DPCs in the two wards of the hospital, St. Dympnas (16 patients) and Clonfert Ward (14 patients). For the reaudit in 2012, a number of further questions were added to the audit tool to address if the name of the patient was present on all pages of the prescription chart, if the frequency of dosing was recorded on the prescription (as well as circled with regards to timing of doses) and whether the front page of the prescription chart was discontinued appropriately with a single line (where one prescription chart replaced another). Four assessors were involved, a Consultant Psychiatrist, NCHD, Pharmacist and Clinical Nurse Manager, in all three audits performed between 2009 and 2012 (Tables 1–3).

## Results

**Table 1.** *Compliance of 100%*

| Criteria | 2009 result | 2011 result | 2012 result | Standard |
|---|---|---|---|---|
| Is the prescription in one piece? | 0% (separate prescribing and administration charts) | 100% | 100% | 100% |
| Is there a section for pharmacy comments? | 0% (no section available) | 100% | 100% | 100% |
| Is there a section for STAT (immediate) medication? | 100% | 100% | 100% | 100% |
| Is there a section for PRN (when required) medication? | 0% (no section available) | 100% | 100% | 100% |
| Is the DOB (date of birth) recorded? | Not assessed | 93.33% | 100% | 100% |
| Is the consultants' name recorded? | 28% | 95% | 100% | 100% |
| Has the prescription chart been reviewed/rewritten within 6 months? | 100% | 100% | 100% | 100% |

**Table 2.** *Compliance of > 90%*

| Criteria | 2009 result | 2011 result | 2012 result | Standard |
|---|---|---|---|---|
| Is the name of the patient recorded? | 87% | 100% | 96.66% | 100% |
| Has correction fluid been used? | 0% | 0% | 3.33% | 0% |
| Is the prescription legible? | 56.33% | 100% | 96.66% | 100% |
| Is the prescription signed? | 90.7% | 97.7% | 93.33% | 100% |
| Is the prescription written in black ink? | 96.3% | 73% | 93.33% | 100% |
| Is the prescription written in indelible black ink? | 43% | 73% | 93.33% | 100% |
| Is the MCRN recorded? | Not assessed | 88.8% | 93.33% | 100% |
| Is the prescription dated? | Not assessed | 93.33% | 90% | 100% |
| Is the route of administration recorded? | 87% | 95.5% | 90% | 100% |

MCRN, Medical Council Registration Numbers.

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**Table 3.** *Compliance of < 90%*

| Criteria | 2009 result | 2011 result | 2012 result | Standard |
|---|---|---|---|---|
| Is the ward name recorded? | < 50% | 95.5% | 86.66% | 100% |
| Is the timing of administration recorded/circled? | Not assessed | Not assessed | 86.66% | 100% |
| Have drug sensitivities/allergies been recorded? | 17% | 71% | 86.66% | 100% |
| Have generic names been used? | 8.21% | 91% | 79.31% | 100% |
| Is the frequency with which PRN meds can be given within 24 hours recorded? | 13.1% | 78% | 72.41% | 100% |
| Is the name of the patient present on each page of the prescription chart? | Not assessed | Not assessed | 63.33% | 100% |
| Have errors been deleted using a single line? | 22.9% | 96% | 62.5% | 100% |
| Has the front page of the prescription chart been discontinued when a prescription chart is replaced by another prescription chart? | Not assessed | Not assessed | 60% | 100% |
| Where a script replaces another, has the latter been cancelled appropriately? | 58.3% | 91% | 52.17% | 100% |
| Have discontinued medications been dated and signed by doctor? | 51.6% | 93% | 43.47% | 100% |
| Has the trade name of the medication been recorded where appropriate? | 0% | 82% | 60% | 100% |
| Is the prescription written in BLOCK capitals? | 4.1% | 62% | 30% | 100% |
| Is the patient's height recorded? | 7% | 9% | 10% | 100% |
| Is the patient's weight recorded? | 7% | 6.6% | 10% | 100% |
| Is there a review date for PRN meds? | 0% | 4.5% | 7.14% | 100% |
| Have errors been initialled? | 5% | 95.5% | 4.34% | 100% |
| Is the frequency of dosing recorded? | Not assessed | Not assessed | 3.33% | 100% |

## Discussion/recommendations

Following the initial audit in 2009, the main perceived challenges included the separate prescribing and dispensing charts in use, the limited amount of generic prescribing, inadequate patient demographics on prescribing sheets, the lack of available space for pharmacy comments, form of medication, PRN/STAT prescribing and MCRN aside signatures, and ultimately the need for continued postgraduate multidisciplinary prescribing education and training. These recommendations were implemented by the Drugs & Therapeutics Committee with the introduction of the new 'fit for purpose' medication chart, which incorporated the above recommendations and, therefore, instantaneously improved adherence to such established prescribing guidelines. The rationale of the reaudit in 2011 was to evaluate this newly introduced prescription chart along with other deficient areas highlighted in the first audit. Results from the reaudit in 2011 revealed significant improvement in multiple areas (due in large part to the introduction of the new DPC), including documentation of patient demographics, availability of both prescribing and dispensing information in one medication chart, documentation of allergies, inclusion of MCRN and availability of pharmacy, STAT and PRN medication sections. Improved generic prescribing was likely to be related to improved adherence to local prescribing guidelines now found in the available prescribing formulary. Areas that have remained with poor compliance over the three audit cycles include medication discontinuation practices, prescribing in BLOCK capitals, addition of review dates for PRN medication, and inclusion of patient height and weight details. It could be deduced that such deficient results are because of both poor adherence to prescribing guidelines and the need for additional postgraduate training sessions to focus on local prescribing procedures. Future audit cycles will continue to implement the current outlined recommendations and will also aim to target continued areas of deficiency.

## Conclusions

Future audit cycles will continue to focus on highlighting suboptimal medicines management, the need for revision of the current DPC, and the provision of prescribing education and training for all staff, which is to be implemented on a six monthly to yearly basis. Recommendations for medicines safety initiatives include the development of a multidisciplinary approach with an emphasis on local and national prescribing guidelines, a standardized

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approach for the reporting of medication errors and adverse reactions, the consideration of implementing electronic prescribing technology in an attempt to minimize errors, continued active interdisciplinary communication with medical and allied health professionals, and the necessity for continued postgraduate education and training for staff at induction and teaching seminars to ensure adequate competencies for all prescribers while also avoiding opportunistic and suboptimal training (Barber *et al.* 2003; Kirke, 2009).

Inclusion of integral allied health professionals, particularly pharmacists, pharmacy technicians and nursing staff will assit the overall medicines management process owing to their heightened awareness of drug-related issues. Clinical pharmacy involvement in the medicines management system would include detailed and accurate medication history on admission, patient education and counselling, prescription monitoring, re-engineering of current community and hospital pharmacy services, and discharge planning and involvement in integrating the medicines management service to community-based/primary care services (Department of Health, 2000; Department of Health, 2001; Scullin *et al.* 2007). Active intervention and collaboration is needed between medical and allied health professionals to modify current prescribing behaviours through dedicated undergraduate and postgraduate educational programmes. Electronic prescribing by computerized physician order entry systems with integrated prescriber decision support services represent the possibility of reducing medication errors (Ammenwerth *et al.* 2008).

From an overall organizational viewpoint, medicines management should continue to remain a priority to encourage investment in patient safety, aim to standardize and optimize the complete process, and to implement repeated audit cycles for continued process redesign with the aim to achieve specific medication safety goals as outlined by local, national and international guidelines (Schnipper, 2011). The Swiss cheese model of causation of medication errors emphasizes the necessity for organizational standardization and the need to implement protective strategies to prevent hazards coming into potentially damaging contact with patients (Reason, 2000). Organizational cultural issues need to be addressed within the overall structure for clinical governance with regards to the acknowledgement, ownership, reporting, recording and feedback of prescribing errors to ensure succinct progress in developing and implementing strategies for minimizing the risk of medication errors, to reduce the resistance to practice change and tolerance of traditional stylistic practices, to address and implement environmental strategies to attend to error-prone conditions and overall implement a collaborative patient-centred approach to multidisciplinary and interagency care (Reason, 2000).

Medicines errors can be addressed by amending the risk management culture, regular induction and training, redesigning process and procedures, computerized technology and the development of clinical pharmacy services (Department of Health, 2001). Error management encompasses the systems approach that endeavours to provide an inclusive management programme aimed at several different targets including the individual, the associated team, the task involved, the workplace and the institution as a whole to identify possible error-prone practices across all steps of the medicines management pathway and ultimately implement strategies aiming to minimize opportunities for such errors to occur (Reason, 2000; Stowasser *et al.* 2004).

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## Conflicts of Interest

None.

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**Appendix**

**Audit tool**

- Is the drug prescription chart (DPC) in one piece?
- Is the name of the patient, ward and consultant clearly written on the DPC?
- Is the patient's DOB (date of birth) on the DPC?
- Are drug allergies/sensitivities recorded on the DPC?
- Is the team/sector identified on the DPC?
- Are the patient's weight and height recorded on the DPC?
- Is there a section to prescribe PRN (*Pro re nata*/as needed) meds?
- Is there a space for pharmacy comments?
- Is there a specific STAT (*statim*/immediate prescription) section?
- Has the DPC been reviewed within the past 6 months (for pts in hospital >6/12)?
- Is the prescription LEGIBLE, written in BLOCK capitals in BLACK, INDELIBLE ink?
- Has the generic names been used for psychotropic meds?
- Has the trade name been recorded in brackets if appropriate? (e.g. Lithium).
- Is the prescription dated and signed?
- Is the Medical Council Registration Number (MCRN) recorded for each signature?
- Has the dose been recorded?
- Has the form been recorded (syrup, etc.) if applicable?
- Has the route of administration been recorded?
- Has the frequency of PRN meds allowed in 24 hours been recorded?
- Is there a review date for all PRN meds?
- Have errors been deleted using a single line and initialled?
- Has correction fluid been used on the DPC?
- Have discontinued meds been dated and signed by the doctor?

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