PAPER

J R Coll Physicians Edinb 2007; **37**:348–351

Writing safe and effective prescriptions in a hospital kardex

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ABSTRACT Several thousand prescriptions will be dispensed each day in a typical National Health Service hospital in the UK. The success of each normally depends on a communication between one healthcare professional (usually a doctor), who has made a diagnosis and formulated a treatment plan, and a second professional (usually a nurse), who will deliver the medicine to the patient. This critical communication, or prescription, should convey all the necessary information about the dispensing of the medicine: which medicine and formulation, who it should be given to, how much, which route, how often, and for how long. Sometimes the prescription will provide discretion to the dispenser about the amount and timing, e.g. for as-required medicines. Confusion surrounding the information conveyed in the prescription accounts for many of the 40,000 serious hospital medication errors reported to the National Patient Safety Agency each year, some of which are fatal. Evidence of poor prescription writing has been documented in numerous studies of hospital prescription charts. Although most prescription errors in hospital are made by junior medical staff (because they write the majority of the prescriptions), more senior staff are also implicated, and importantly have an opportunity to lead by example. Not surprisingly, the Department of Health in the UK is taking the issue of safety related to medicines very seriously.

This brief review highlights important principles and rules that support safe and effective prescribing in hospitals. It was first published as part of this College's CME online module on Clinical Pharmacology.

KEYWORDS Drugs, hospital, medication error, patient safety, prescribing

LIST OF ABBREVIATIONS British National Formulary (BNF), 'to take out' (TTO)

DECLARATION OF INTERESTS No conflict of interests declared.

Published online ***July 2007***

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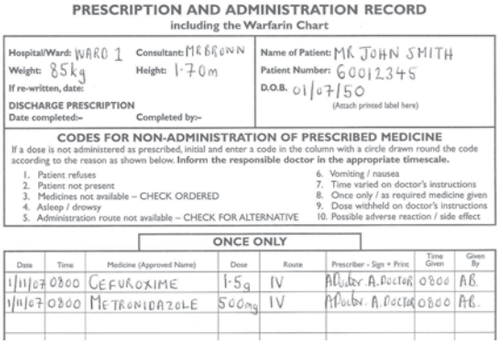
TYPES OF PRESCRIPTION

The main tool used to direct administration of medicines in a hospital setting is the Prescription and Administration Record (the 'kardex'). There are many variations in use but most contain the following sections:

- *Basic patient information* Identifies the prescription with the correct patient. Often 'filled in' using a sticky addressograph label, which introduces the real possibility of serious error.
- *Previous adverse reactions/allergies* For communicating important patient safety information based on a careful drug history or the medical record.
- *Other medicines charts* Notes any other hospital prescription documents that contain current prescriptions being received by the patient (e.g. anticoagulants, insulin, oxygen).
- *Once-only medications* For prescribing medicines to be used infrequently such as single-dose prophylactic antibiotics and other pre-operative medications (see Figure 1).
- *Regular medications* For prescribing medicines to be


PRESCRIPTION AND ADMINISTRATION RECORD
including the Warfarin Chart

Hospital/Ward: WARD 1 Consultant: MR BROWN
Weight: 85kg Height: 1·70m
If re-written, date:
DISCHARGE PRESCRIPTION
Date completed:- Completed by:-

Name of Patient: MR JOHN SMITH
Patient Number: 60012345
D.O.B. 01/07/50
(Attach printed label here)

CODES FOR NON-ADMINISTRATION OF PRESCRIBED MEDICINE
If a dose is not administered as prescribed, initial and enter a code in the column with a circle drawn round the code according to the reason as shown below. **Inform the responsible doctor in the appropriate timescale.**

1. Patient refuses
2. Patient not present
3. Medicines not available – CHECK ORDERED
4. Asleep / drowsy
5. Administration route not available – CHECK FOR ALTERNATIVE
6. Vomiting / nausea
7. Time varied on doctor's instructions
8. Once only / as required medicine given
9. Dose withheld on doctor's instructions
10. Possible adverse reaction / side effect

ONCE ONLY

Date	Time	Medicine (Approved Name)	Dose	Route	Prescriber - Sign + Print	Time Given	Given By
1/11/07	0800	CEFUROXIME	1·5g	IV	A Doctor A. DOCTOR	0800	AB.
1/11/07	0800	METRONIDAZOLE	500mg	IV	A Doctor A. DOCTOR	0800	AB.

FIGURE 1 'Once-only' prescribing section of the hospital drug chart.

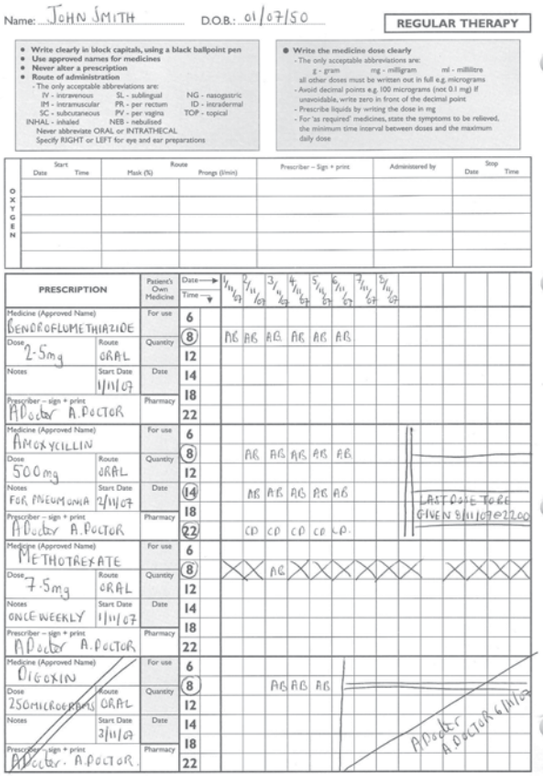


FIGURE 2 'Regular medication' prescribing section of the hospital drug chart.

taken for a number of days or continuously, such as a course of antibiotics, antihypertensive drugs, anti-Parkinsonian drugs, etc. (see Figure 2).

- *As-required medications* For prescribing for symptomatic relief, usually to be administered at the discretion of the nursing staff, e.g. anti-emetics, analgesics (see Figure 3). Prescribers should always note the indication, frequency, minimal time interval between doses, and maximum dose in any 24-hour period.

Other important hospital prescription forms include those for specific drugs (e.g. anticoagulants, insulin) and fluids, and hospital discharge forms for 'to take out' medicines.

GENERAL CONSIDERATIONS BEFORE PRESCRIBING

A fundamental principle of rational prescribing, deserving of consideration prior to writing any prescription, is that, on the balance of probability, the patient has a significantly greater chance of deriving benefit from the prescribed medication than being harmed. This judgement depends on knowledge of four important areas:

i the clinical and medication history, including previous adverse reactions;
ii the clinical diagnosis;

FIGURE 3 'As-required' prescribing section of the hospital drug chart.

iii relevant patient and clinical factors that might influence drug action, e.g. age, pregnancy, renal and hepatic impairment; and
iv familiarity with the medicine to be prescribed.

Uncertainty in any of these areas is likely to increase the chances of adverse outcomes.

There are many excellent resources such as the BNF that support rational prescribing but none can anticipate the myriad of circumstances that individual prescribers face on a day-to-day basis. Having taken the factors above into account, if doubt remains about the wisdom of prescribing, it may be appropriate to seek a more experienced opinion, if available. Patient consent is usually assumed when prescribing on hospital wards but there may be circumstances where this should be obtained specifically, e.g. high risk of adverse events.

WRITING THE PRESCRIPTION

- Write in block capitals, legibly, with black ballpoint pen. Most medicines will be administered by nursing staff in the absence of the prescriber, so clarity is essential.
- The beginning of every prescribing process should be the clear and unambiguous labelling of the kardex (or any other prescription chart) with the details of the intended recipient. Essential identifying details such as the patient's name, hospital number, and date of birth (and age if under 12 years) should be written on every sheet. Patient's weight and height may be required to calculate safe doses for many drugs with narrow therapeutic indices.
- The drug sensitivities/allergies box should be checked and further details of the drug history obtained if there are any doubts about its accuracy.
- Use generic drug names rather than brand names (e.g. simvastatin, not Zocor®). The only exceptions to this rule are if there is variation in the properties of different brands (mainly in lithium, theophylline, and phenytoin) or the drug is a combination product with no generic name, e.g. Kliovance® and other HRT

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preparations. Avoid abbreviations such as 'ISMN' (for isosorbide mononitrate).

- Write the drug dose clearly. The only acceptable abbreviations are 'g' and 'mg'. 'Micrograms' must always be written in full, never as 'µg'. 'Units' (with regard to insulin, heparin, etc.) must always be written in full. Avoid decimal points, i.e. use 500 mg not 0·5 g. If a decimal point cannot be avoided, always put a '0' in front of it, e.g. '0·5 micrograms' not '·5 micrograms'. It is not necessary to use a decimal point if the number is a round number, e.g. 7 mg not 7·0 mg. For liquid preparations write dose in mg. The only exceptions when 'mL' can be written are if the product is a combination product (e.g. Gaviscon® liquid), or if the strength is not expressed in weight, e.g. adrenaline 1 in 1,000. Use numbers/figures (e.g. 1 or 'one') to denote use of a sachet/enema. Always include dose of inhaled drugs (e.g. corticosteroids) in addition to stating '2 puffs', as strengths can vary.
- Widely accepted Latin abbreviations for dose frequency are: once daily – 'OD'; twice daily – 'BD'; three times daily – 'TDS'; and four times daily – 'QDS'. The hospital kardex usually requires specific times to be identified that coincide with nursing drug rounds.
- Widely accepted abbreviations for route of administration are: intravenous – 'IV'; intramuscular – 'IM'; subcutaneous – 'SC'; sublingual – 'SL'; per rectum – 'PR'; per vagina – 'PV'; nasogastric – 'NG'; intradermal – 'ID'; and topical – 'TOP'. Never abbreviate 'oral' or 'intrathecal'. Care should be taken in specifying 'right' or 'left' for eye drops and ear drops.
- Space is provided for notes on important administration advice not detailed elsewhere (e.g. whether a medicine should be taken with food, type of inhaler device used, and anything else that relevant the drug dispenser should know). It is also important to state here the times for peak/trough plasma levels for drugs requiring therapeutic monitoring.
- If a course of treatment is for a known time period, cross off subsequent days when the medicine is not required. For example, for a seven-day course of antibiotics, put a vertical line through the eighth day to 'gate' the prescription. Similarly, if a drug is not to be given every day, cross off the days it is not required. For example, drugs such as alendronic acid and methotrexate usually have a once-weekly schedule.
- Always sign and print your name, and date each prescription. If a prescription record runs out and needs to be re-written, the start date is the day noted on the original card.
- Discontinuation of an individual prescription should be done carefully with a vertical line at the point of discontinuation, horizontal lines through the remaining days on the kardex, and diagonal lines through the prescription details and administration boxes. Sign and date this action and consider writing a supplementary note to inform colleagues about this action. The underlying details should remain legible.

1 Trying to amend an active prescription, e.g. altering the dose/timing (avoid and rewrite).
2 Writing up drugs in the immediate presence of more than one kardex or set of notes.
3 Diverting your attention in the middle of completing a patient's kardex.
4 Prescribing 'high risk' drugs, e.g. anticoagulants, opioids, sedatives.
5 Prescribing parenteral drugs.
6 Rushing prescribing, e.g. in the midst of a busy ward round.
7 Prescribing drugs with which you are unfamiliar.
8 Transcribing multiple prescriptions from an expired kardex to a new one.
9 Writing prescriptions based on information from another source (e.g. a referral letter) because: (i) the list may contain errors and (ii) the medicines may be the cause of the patient's illness. Take the same care as you would a newly written prescription.
10 Writing up TTOs – these will become patient's regular medication for the immediate future.
11 Calculating drug doses – accounts for up to 20% of prescribing errors (never prescribe if in doubt, ask for an independent calculation).

TABLE 1 'High risk prescribing moments' – times when important prescribing errors are more likely.

- For as-required medicines, provide exact instructions as to the maximum frequency, for example 'not more often than four-hourly' (see Figure 3).
- Controlled drugs (e.g. opioid analgesics) are identified in the BNF by the symbol 'CD', and prescriptions are subject to additional legal requirements. In the UK such prescriptions should contain the address of the patient and prescriber (not necessary on most hospital forms), the form and the strength of the preparation, and the total quantity of the preparation/number of dose units in words and figures.

OTHER CONSIDERATIONS AFTER PRESCRIBING

There are a number of important considerations that follow an initial prescription. The patient should be provided with relevant information about the medicine. There may be early symptomatic warnings of common adverse events or monitoring tests that help to reduce serious adverse events. There may be specific instructions required for taking the medicine. When medicines are initiated (or discontinued), an entry should be placed in the patient record to justify these decisions, as this provides valuable information for other colleagues involved in the patient's care. This is especially important for drugs that require therapeutic monitoring (e.g. digoxin, lithium), for drugs prescribed outside their licensed use, or for those discontinued because of adverse effects. It is a basic principle that a prescription will be followed by some sort of judgement as to its success or

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failure so that appropriate changes can be made if necessary (e.g. ineffective medicines stopped or substituted).

OTHER TYPES OF HOSPITAL PRESCRIPTIONS

- *Infused drug prescriptions* The prescription must include the name and dose of the additive drug, the type/concentration/volume of fluid, the dilution, route of administration/line used, and the rate of infusion.
- *Supplementary prescription charts* The use of supplementary charts should always be noted on the main hospital chart. There is usually a specific box on the front page but, for regular medicines, we recommend making a specific entry in that section of the main kardex (prescribers should be familiar with their local policy). Common examples are warfarin, insulin, and oxygen. Prescriptions for oxygen should include the delivery method to be used, the inspired oxygen concentration (e.g. 24–35%) or the flow rate (e.g. 2–4L/min) in the case of uncontrolled delivery such as for nasal prongs, the duration of treatment and the target oxygen saturation.
- *Hospital discharge medicines (TTO)* Most patients will be prescribed a short course of their medicines at discharge to last until they can visit their general practitioner. This prescription is particularly important because it usually informs about future therapy at the point of transfer of prescribing responsibility. Great care is required to ensure that this list is accurate and that any hospital medicines to be stopped are not included or are identified as short duration (to be specified).

SUMMARY

Even with a thorough knowledge of medicines, prescribing errors can still be made, especially when attention is diverted. Multiple factors contribute to lapses – hectic work environment, busy workload, time pressures, and poor team communication. Within these general difficulties there are some specific times when serious mistakes are more likely and the need for attention to detail is greatest. We have labelled these 'high risk prescribing moments' (see Table 1). The chances of a prescribing error resulting in patient harm are, fortunately, minimised by the provision of a regular clinical pharmacy service in most UK hospitals. Another important future development in hospitals is the role out of electronic prescribing, although early optimism about the power of this initiative to reduce prescribing errors has required a reappraisal as users have found new ways to err.

KEYPOINTS

- Always take care to make a reasonable assessment of potential benefit and harm before prescribing.
- Prescribe legibly in black pen to avoid uncertainty amongst colleagues.
- Be aware of situations where risks are highest and extra care is required (e.g. insulin, warfarin, unfamiliar medicines).
- Make sure that the patient understands the rationale for taking the medicine, is able to take the medicine properly, and is aware of any precautions or frequent adverse events that might necessitate early review.
- After a prescription, review the success (or otherwise) of the treatment and make sure that appropriate arrangements are in place for review or monitoring.

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Editor's Note

The high level of prescription errors in practice and the potential seriousness of their effects is reported by Gray *et al.* on p.305 in this issue of *The Journal.* Readers are referred to this paper.