Physicians, nurses and pharmacists are all responsible for providing an unwavering commitment to safety and efficacy in the use of medications by patients. The implementation of MIRP can be taken as an opportunity for quality improvement in reducing/avoiding the chance of MI recurring through past experience. ALL hospitals are required to submit quarterly statistical returns to the Chief Pharmacist’s Office so that data for the entire HA can be analysed and consolidated. Data gathered from MIRP can be used to target areas where improvement in quality is necessary.

Discussion:

Supervisors, department managers and appropriate committee are recommended to review the medication incident reports periodically, determine the underlying causes of the errors (e.g., lapses in individual performance, workload, packaging/labelling, confusing orders), and develop actions to prevent their recurrence (e.g., improving staff education, reviewing and revising existing policies and procedures, or changing facilities, equipment, or supplies). When appropriate, the supervisor and the staff members who were involved in the incident are suggested to confer on how the incident occurred. Above all, MI reports should not be used for punitive purposes as these would only stifle the voluntary reporting of MIs and undermine quality-improvement efforts. Methods to encourage the reporting of MIs is a quality-improvement challenge.

It has been noted by Leape1 (1995) that human errors are often caused by system failures (characteristics of the workplace that make errors more likely). Thus, only by identifying system problems that contribute to incidents rather than focusing primarily on the individual worker as the cause and responsible agent in the event of an incident can effective and feasible strategies be derived and in turn the actual number of incidents can be reduced. Cause-and-effect diagram is a quality improvement/management tool that can be used for problem solving. Such diagram illustrates the various root causes affecting a process by sorting out possible causes and their consequences. Staff are encouraged to participate in problem solving by developing a cause-and-effect diagram which facilitates their better understanding of the process. Often it is helpful to put causes into general categories, such as people, equipment, procedures and so forth. Figure 1 depicts a cause-and effect diagram that attempts to identify the various causes for medication incidents in a hospital setting.

[Diagram of cause-and-effect diagram for the identification of causes for medication incidents]

This bulletin is prepared and compiled by the Chief Pharmacist’s Office, HAHO. For enquiries, please call 2515 2531.
In the above diagram, the effect or problem is stated on the right side of the chart and the major influences or “causes” are listed on the left. From this list of possible causes, the most likely are identified and selected for further analysis. After the various causes have been brainstormed, they can then be reviewed and data collected to determine the relative frequencies of the more important causes by constructing pareto charts.

In general, approach illustrated in Figure 2 could be used for quality improvement by department. A key issue to be addressed is to ensure “closing the loop”, i.e. with any quality improvement initiative, the real benefits/changes are realised. Overseas experience illustrates that the closing of the loop is more likely to be achieved when relevant groups of professional staff have been involved in each step. Furthermore, the best incentive for improvement is to ensure regular feedback of those successes - how things improve for the patient, for the staff, and for the organisation.

So if you have experienced any difficulty in implementing MIRP in your hospital or encounter any major MIs, please consider using this ‘cause-and-effect’ analysis approach.

**Data Analysis**

Statistical returns for the period between 1 October and 31 Dec. 1994 were analysed and are presented as follow:

**Medication Incidents Information**

**A) Number of Cases Reported:**

There were 34 returns with a total of 2699 cases reported in this bulletin, which is more than double of the 1058 cases from the last report (31 returns); reflecting increased positive support from various institutions. Such significant increase in MIs reported is due to the contribution from one hospital where over 1000 cases were reported for this quarter and its data was not reported previously. By and large the distribution of in-patient and out-patient cases is similar to the last report (Fig. 3).

**B) Type of Staff Involved:**

Pharmacy and medical staff were involved in almost 90% of medication incidents (Fig. 4). The notable change in the type of staff involved is because of the inclusion of data as reported by one hospital pharmacy. All dispensing errors which were intervened were documented and reported. The reason for inclusion of this data is to highlight to pharmacy staff the importance and significance of self and double-checking; without which many errors would escape the pharmacy’s notice.

**C) Type of Incidents:**

The most common type of incident reported was wrong drugs (35.2%), followed by wrong dose (26.1%; Fig. 5).
Dose errors could be due to the lack of knowledge that more than one strength of a drug exists and the placing of a drug in the wrong storage location, thus potentially predisposing individuals who do not read labels to make errors. Health professionals are recommended to read labels 3 times, check medication's identity and strength against prescription order and MAR before dispensing and administering to patients respectively.

Drug omission accounted for 6% of the errors whilst extra dose, wrong patient, wrong time and wrong route each accounted for about 2% of the total error reported.

![Figure 5. Type of Error in Medication Incidents](image)

**D) Underlying Causes:**

The most common underlying cause of incidents was grouped under ‘Others’ by the hospitals (Fig. 6). Further classification of the underlying causes has been incorporated in the revised reporting form (effective on 1/4/95) to provide a better understanding of the underlying causes of MIs so as to identify opportunities for prevention and improvement. If you have not received the revised reporting forms, please do not hesitate to contact us. New categories being included are: inadequate knowledge or skills, failure in communication/misinterpretation of order, distraction/stress, performance deficit, lack of supervision or may be staffing problems. Unclear prescription and transcription consistently stand out as the most common underlying causes. Direct computerised order entry system whereby doctor’s prescriptions are directly entered at ward level and out-patient clinic into the pharmacy computer system is one of the solutions to unclear prescription and transcription problems. Pilot studies with such direct entry system are being carried out at 3 major hospitals, namely QMH, QEH and PWH which will be extended to 4 other institutions later this year. In the meantime, copy of the MAR in the doctor's original handwriting in the forms of fax or NCR paper can be used to avoid transcription.

**E) Patient Outcome:**

The majority of cases (87%) were non-patient related which were detected and intervened before medication actually reaches the patients. The clinical significance of most patient-related cases is minimal, with little or no adverse consequence to the patient morbidity.

**F) Severity Index of Incidents:**

Most of the incidents belonged to index ‘1’ or ‘0’ and are incidents which had occurred without causing injury to patient. 48 incidents have occurred with severity index of ‘2’ or ‘3’ which required monitoring but without injury to patients and 3 cases were of index ‘4’ (Fig. 8). Coincidentally, two of the three index ‘4’ incidents involved the administration of wrong doses (10 fold increase) of lidocaine and potassium chloride injections. Special attention should focus on the prospective monitoring of the appropriate use of both drugs.
which are associated with a high frequency of adverse events. Severity Index is defined as follows:

6= an incident occurred that resulted in patient death.
5= patient received medication incorrectly and sustained permanent injury
4= patient injured by the error and required either antidote reverse the process or transferred to a higher level of care.
3= patient required increasing monitoring with a change in vital sign as a result of the incident but no ultimate injury.
2= patient required increasing monitoring as a result of the incident but no change in vital sign and no patient injury.
1= incident occurred that did not result in patient injury.
0= incident stopped before reaching the patient.

Incidents with severity index of 4, 5, or 6 should be examined by the Hospital Drug Committee so that measures are taken to ensure the same incident will never be repeated.

Case Study: Digoxin

Description Of Incident
- A prescription was written for Digoxin 125 mcg q.d.
- The prescription was interpreted and entered into the computer as 125 mcg q.i.d. by pharmacy staff.
- Instruction was given to patient as 125 mcg of digoxin to be taken four times daily on the dispensing label.
- A total dose of 3 mg of digoxin was taken by the patient (dosing interval of four times daily) before admitted to the Accident & Emergency Department with digoxin overdose and antidote was given.

Background
- Digoxin is a cardiac glycoside with positive inotropic and negative chronotropic activity. It is used to control ventricular rate in atrial fibrillation and in the management of congestive heart failure with atrial fibrillation.

- The margin between toxic and therapeutic doses is SMALL.
- Most serious adverse effects are ventricular dysrhythmias, heart block and arrhythmias. Other adverse effects include anorexia, nausea, vomiting, headache, confusion, hallucinations and visual disturbances.

- Usual loading for adults: rapid digitalisation: 1 - 1.5 mg in divided doses over 24 h
less urgent digitalisation: 250-500 mcg daily (higher dose divided).

- Maintenance dose for adults: 62.5 - 500 mcg daily (higher dose divided) according to renal function and, in atrial fibrillation, on hear-rate response; usual range 125-250 mcg daily (elderly 125 mcg)

- Usual dosing interval: once daily for adult patients receiving ≤0.25 mg/day and twice daily for patients receiving >0.25 mg/day.

Causes For The Incident
- The incident was due to dangerous abbreviation being used. i.e., "q.d.," which was misinterpreted as q.i.d., leading to digoxin to be taken four times a day instead of once.

Recommendations
- All pharmacy staff should be fully aware of the normal dosage range of drugs. Any deviation from normal dosage range should be checked and confirmed.

- Prescribers should review all drug orders including legibility immediately after they have written them. Instructions should be printed out or better still avoid using “q.d.,”.

- Hospitals are recommended to set up an approved list of abbreviations with periodic review of this list.

Reference

Don’t Hold on to Dangerous Habits-
Spell it out DAILY

1. Never abbreviate the word “daily”
2. Write “daily” rather than “q.d.,” which could be misinterpreted as “q.i.d.”

A medication error reduction tip from the CHIEF PHARMACIST’S OFFICE