



▼ REVIEW ARTICLE

PRESCRIPTION ANALYSIS: DETECTION AND AUDITING IN TEACHING HOSPITALS

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ABSTRACT ►

Prescription analysis will help the medical professional to be aware of their prescription habits. Errors in prescribing medication can result in lengthy hospital stay, undue discomfort and disability or even increase in mortality. Early detecting and auditing will trigger warnings and encourage a diffusion culture of safe practice. Patient safety must be the first aim in every medical setting, thus learning from error and taking measures to prevent them will help in building safer health care system.

≡ INTRODUCTION

Prescribing medication has become an integral part of medical care. Accurate decision making in prescription can prevent errors. A general practitioner writes around 13000 prescriptions per year, of which around 8000 prescriptions are repeats.^[1-4] Elderly population is the most jeopardized group in health care settings. A prescription is 'a written order, which includes detailed instructions of what medicine should be given to whom, in what formulation and dose, by what route, when, how frequently, and for how long'.^[5] A medication error is any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in control of the health care professional, patient, or consumer. There are around four types of medication errors:

Knowledge-based errors can be related to any type of knowledge, general, specific, or expert. It is general knowledge that penicillin can cause allergic reactions; knowing that your patient is allergic to penicillin is specific knowledge; knowing that co-fluampicil contains Penicillin is expert knowledge. Ignorance of any of these facts could lead to a knowledge-based error.

Rule –based error: Failure to apply a good rule or application of a bad rule.

Technical error: It is defined as 'an outcome fails to occur or the wrong outcome is produced because of execution of an action which was imperfect'.^[6]

Memory-based errors occur when something is forgotten; for example, giving penicillin, knowing the patient to be allergic, but forgetting.

A prescription error forms a subset of medication error. Prescription error can be defined as 'a failure in the prescription writing process that results in a wrong instruction about one or more of the normal features of a prescription'.^[7] Among medication errors, prescription error are the most common,^[8] though they are harmless a few number can be potentially dangerous. Studies have shown that 15-21% prescriptions contain at least one prescribing error.^[9,10] Researches on prescription errors by Gregory,^[11] Jones,^[8] and Austin^[12,13] has stressed on listing the error types and quantifying them. Trivial importance is given on preventing errors and the perilous consequences of errors.

≡ METHODS

Pubmed, EMBASE, International Pharmaceutical Abstracts and Science direct were searched using the key words "Prescription OR prescribing", "Audit", "Prescription audit" "medication audit", "Prescription

error OR Medication error”, “Questionnaire for assessing health care OR Criteria for assessing health care”. The search terms were mapped onto Medical Subject Heading (MeSH) and searched through the database as key search . Limits specified English language paper with tag terms title/abstract. Emphasis was placed on methodologically sound articles, focusing on the process of auditing, error detection methods and tools for analysis.

Audit

Audit is an educational activity that promotes high health care. It is a way of comparing what we practice against what the research evidence indicate.^[14] It helps to assess the appropriateness of specific healthcare decision, services and outcomes. Steps of auditing are illustrated in image 1. Prescription audit in teaching hospital involves cost audit as well as technical audit. Cost Audit is term used for Pharmacoeconomic auditing which deals with drug uses on aspect to cost-benefit, cost-effectiveness, cost-minimization, cost-of-illness and cost-utility analyses that can be compared with pharmaceutical products and treatment strategies. Analyzing the prescriptions on the Pharmacoeconomic aspect will help to reduce the hospital based financial load on patients. Technical Audit is further fractionated into 4 major categories, Prescription error, Drug related prescription fault, Patient related prescription fault and Analysis and learning from previous error.

Prescription errors

Prescription errors were categorized by Neville et al according to the nuisance they may cause in health care system.^[15] According to this method, prescription errors are stratified into four types: 1. **Type A: Errors which are potentially serious to patient.** Prescription which would be dangerous to the patient like 10 fold increase in dose of cardiac drugs or indistinguishable drug spellings for example: Dexamethasone and Dextromethorphan.

2. **Type B: Errors causing major nuisance** by making a pharmacist to contact the prescriber in order to dispense the medicine. Patient, Doctor and pharmacist are thus all inconvenienced. It includes inadequate information about Dosage form of the drug, dose of the drug, unknown refurbished brand names and illegible handwriting.

3. **Type C: Errors causing minor nuisance.** It requires professional decision by pharmacist, though

a pharmacist can take own decision it may cause delay in dispensing the medicine to patients. For Example: wrong pack size of solutions, using unauthorized abbreviations (PC for Paracetamol)

4. **Type D: Trivial errors** consisting of spelling errors or omissions of details which do not hamper the execution of prescriptions.

Drug related prescription fault

Inappropriate doses and dosing frequency are commonly encountered in prescriptions. Overdosing was common with antimicrobial agents and cardiovascular drugs.^[16] Polypharmacy more frequently resulted in adverse drug reaction. Longer duration of treatment with controlled prescription drugs can lead to abuse liability.

Patient related prescription fault

Patient factors like reduced renal and hepatic function or allergy history may require atypical or unusual dosage and frequency. These factors may be a leading cause to produce adverse effects.^[17,18] Treatment schedule involving geriatric and pediatric population are associated with potentially inappropriate prescription and errors.^[18] Unstated history of smoking and alcohol can significantly result in medication error.

Analyzing the error

Medication errors are to be identified and analyzed as a cause of concern that requires continuous monitoring with insistence on what the fault was rather than who made it. An inappropriate prescription is defined as irrational choice of drugs and overuse or underuse of appropriate drugs.^[19] Appropriateness of prescription is assessed by criterion –based or Judgment based indicators.^[20] Criterion –based indicators are obtained from published reviews, subject expert, and consensus techniques. Judgment based indicators are developed by clinicians by obtaining patient information and published work, to make judgment from appropriateness.^[21] Serious consequences due to prescription error and prescription faults have lead the researchers to develop screening tools to detect prescription faults.

Tools to detect errors

Medication Appropriateness Index(MAI): It measures prescription appropriateness in accord to the ten criteria's: indication, dose, effectiveness,

practical directions, duration, cost, correct directions, drug-drug interaction, drug- disease interaction and duplication. The evaluator can rate the given medication as “appropriate,” “marginally appropriate,” or “inappropriate.” The measures for inappropriateness for medication are scored from 0 to 18.^[22-27]

Naranjo scale: It was developed by Naranjo et al to identify whether the adverse drug reaction is due to drug or other factors. It contains 10 questions which has to be rated as yes/no/don't know. Naranjo algorithm scores as : >9 = definite ADR; 5–8 = probable ADR;

1–4 = possible ADR; 0 = doubtful ADR.^[28]

Assessing Care Of Vulnerable Elder (ACOVE)^[27]: Rand Healthcare and the UCLA developed a quality indicator for assessing the quality care of Vulnerable geriatric patients. It contains 69 indicators which assess elder patient care and not the outcomes.^[29]

Phadke's Criteria^[30,31]: Phadke's criteria is a method to assess a prescription for rationality as a whole and assign the status as rational, semi rational or irrational to it. It is based on a 30- point scale comprising of 20 points for main drug/s and 10 points for complementary drug/s. Half of the points (10 and 5 respectively) for each of these two categories are allotted to the drug chosen for the condition and remaining half for the correctness of the dose given, including route and frequency of administration and the duration of therapy. If more than two drugs are needed to be given in a condition, the points allocated are subdivided accordingly. For deciding the correctness of the selection of a drug, its dose, route, frequency of administration and duration of therapy, the evidence base is searched and applied. In computing the final score (out of 30), when necessary, negative points are assigned as: (a). Irrational drugs or irrational drug combinations: 5 for each drug/formulation. (b). Unnecessary drug or injection: 5 for each drug/formulation. (c). Hazardous drugs: 10 for each drug/formulation. (d). Unnecessary injection: 5 for each injection.

Beers criteria^[32] are a comprehensive set of explicit criteria for potentially inappropriate drug use in elderly aged 65 years and above. Accordingly inappropriate drugs are categorized as the drugs that generally should be avoided in older adults (Category A), drugs that exceed maximum recommended daily dose (Category B) or drugs to be avoided in combination with specific comorbidity (Category C).

START and STOPP^[33,34]: This is a tool to assess prescription omissions. The acronym START / STOPP states “screening tool to alert doctors to the right treatment [START] and screening tool of older people's prescriptions [STOPP]”. START tool has 22 evidence –based indicators for common omission prescriptions and STOPP incorporates 65 indicators pertaining to drug-drug and drug-disease interactions and therapeutic duplication.

Zhan's Criteria^[35]: It focuses on drugs that have to be avoided in elderly irrespective of dosage and drug interactions. It categories drugs as inappropriate, rarely appropriate and sometimes appropriate.

Chart review is a practice based on clinical sources like prescription data, electronic medical records, computerized physician order entry (CPOE). It is retrospective way of analyzing errors and adverse effects^[36-39]. Chart review requires meticulous planning in training reviewers, creating inclusion criteria and identifying triggers. The major drawback is need for human resource and further the result generated depends on the documentation and reviewers capability to identify triggers.

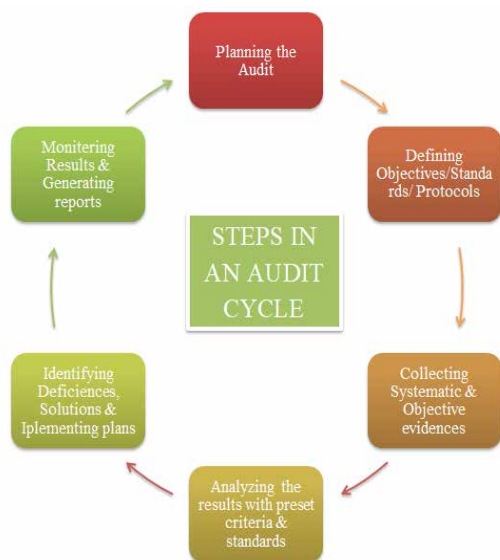
A teaching hospital with team of subject experts brings prescription analysis into accessible dome. The use of computers for prescription writing also may reduce prescription errors.^[40,41] The computerized system can be integrated with patient details including his/her physiological parameters, known allergies, real time information regarding availability of medicines, and the system can be tailor-made to offer best possible therapy. Before the prescription is finalized, such an integrated system can also provide medicine specific information, alerts regarding possible over dosage, interactions among medicines etc. Besides technical inputs, these electronic prescriptions can expedite repeated monthly prescriptions for patients who are on long term treatment. With this system generating data and analyzing data occurs with ease. A schematic approach on detecting faulty prescription, analyzing the problem, identifying the solutions and implementing it will help in providing a safer health care to patients.

CONCLUSION

Prescription analyzes help in detecting error and paves way for improvement in performance. Audit is a relatively simple tool for evaluating actual performance and in planning corrective actions to reduce the risk of

errors. A teaching hospital with group of expertise is a wise center to conduct prescription analysis and teach the medical students the importance and benefits of detecting and auditing imprecise prescription. This will enlightened the future health professions to work together in creating a safer health care system.

IMAGE 1: Steps of Audit Cycle



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