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Minimizing Medication Errors: Communication about Drug Orders - 2015

Medication Errors: Definition of the Problem

Medication errors are defined as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient or consumer. Such events may be related to professional practice, health care products, procedures and systems, including prescribing, order communication, product labeling, packaging and nomenclature, compounding, dispensing, distribution, administration, education, monitoring and use," by the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP).[1] Information about medication errors is collected through reports to the US Food and Drug Administration (FDA),[2] direct contact reports (MedWatch)[3] or reports from the US Pharmacopeia (USP)[4] or Institute for Safe Medication Practices (ISMP).[5]

Medication errors are a common cause of malpractice claims against physicians. The Physician Insurers Association of American (PIAA) reviewed data on 117,000 claims and lawsuits and found that medication errors were the second most common cause for claims.[6] In this review of 700 medicolegal cases in ophthalmology, medication errors were found to be the third most frequent complaint. Although medication errors constituted only 2% of the claims for the Ophthalmic Mutual Insurance Company (OMIC) insureds, these claims have been more costly than the average case and more likely to result in indemnity payments.[7] A 2005 study of prescription errors at an ophthalmic hospital showed that 8% of prescription sheets had errors.[8]

There is a significant potential for error because of the high volume of medications prescribed and dispensed. "Adverse drug events are among the most common causes of health care related harm, affecting approximately two million hospital stays and accounting for an estimated 3.5 million physician office visits and one million emergency department visits per year, according to the National Action Plan for Adverse Drug Event Prevention," the USP said in a statement. "Additionally, at least 20% of all harm to hospitalized patients is associated with medications."[9]

In 1995, it was estimated that ophthalmologists prescribed medications at 52.4% of all patient visits in the office (21,340,000 visits from a total of 40,714,000 visits), according to the National Ambulatory Medical Care Survey.[10] Of all patient visits, 23.8% of the visits involved 1 medication, 15.1% of the visits involved 2 medications, and 13.5% of the visits involved more than 2 medications. A total of 42,098,276 or over 40 million medications were prescribed or provided in 1995 in ophthalmologists' offices.

Contributing Factors to the Problem

The American Hospital Association lists these common factors that contribute to medication errors:[11]

1. Unavailable patient information (not knowing about patients' allergies, drug contraindications, diagnoses, and lab values)

2. Unavailable drug information (lack of up-to-date warnings and pharmacist consultation)

3. Miscommunication of drug orders (poor handwriting, confusion between drugs with similar names, careless use of zeroes and decimal points, confusion over metric or other dosing units, use of inappropriate abbreviations, ambiguous orders)

4. Problems with labeling, packaging and drug nomenclature (inappropriate preparation, packaging and labeling, especially when the drug is prepared and repackaged into smaller units)

5. Drug standardization, storage, and stocking (confusion arising from stocking multiple concentrations of the same drug or storing drugs in look-alike containers or in ways that obscure drug labels)

6. Drug device acquisition, use and monitoring (lack of standardization in drug delivery devices, improper default settings, unsafe equipment and verification of dose and rate settings)

7. Environmental stress (factors such as lighting, heat, noise, and interruptions that can distract staff and affect individual performance particularly when transcribing orders)

8. Limited staff education (lack of awareness of error-prone situations go unidentified and persist in causing problems)

9. Limited patient education (without appropriate education)

10. Quality improvement processes and risk management (improper systems for identifying, reporting, analyzing, and correcting errors, and identifying trends, and measurement systems for tracking effect of system changes, and cultivating a non-punitive attitude to error

In April 2015, the USP announced NCC MERP's adverse drug event terminology and algorithm, NCC MERP Contemporary View of Medication-Related Harm fact sheet , to help determine whether an adverse drug event is preventable or non-preventable. [9] The Council proposed the following terminology:

"Preventable ADE" is harm caused by the use of a drug as a result of an error (e.g., patient given a normal dose of drug but the drug was contraindicated in this patient). These events warrant examination by the provider to determine why it happened.

"Non-Preventable ADE" is drug-induced harm occurring with appropriate use of medication (e.g., anaphylaxis from penicillin in a patient and the patient had no previous history of an allergic reaction). While these are currently non-preventable, future studies may reveal ways in which they can be prevented.

The USP released a previous report on the 1999 national database for hospital medication error

reporting.[12] The analysis showed that most errors (97%) did not result in patient harm. The most frequent types of errors were: 1) omission (failure to administer an ordered dose), 2) improper dose/quantity, and 3) unauthorized or wrong drug. The primary factors that contributed to medication errors were described as workload increases and distractions.

Drugs with Similar Names

The Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) released a Sentinel Event Alert in May 2001 about look-alike, sound-alike drug names, and pointing out that the potential for error was significant.[13] In February 2015, ISMP issued a comprehensive list of drugs that had been reported because of confusion over similar names.[14] Factors contributing to this confusion are the introduction of new drug products, illegible handwriting, similar packaging, incomplete knowledge of the full drug name, and errors in selecting the appropriate drug from a computerized listing. In its 1999 report, "To Err is Human: Building a Safer Health System," the Institute of Medicine recommended that FDA require manufacturing companies to test proposed drug names in order to identify and remedy potential sound-alike and look-alike confusion with existing drugs.[15] The FDA reviews and evaluates proposed drug names and rejects names with the potential to cause confusion; however the problem persists.

To avoid confusion based on generic versus brand names, JCAHO standards require that all dispensed medications be labeled in a consistent method, having both the generic and the brand name. JCAHO also stipulates that hospitals and ambulatory care centers consider the potential for medication errors in terms of selection of products for a formulary. For example, an institution may decide not to select products with similar names or packaging, or else take precautions with the storage and handling of both medications. To address drug nomenclature, USP convened a 2015–2020 Nomenclature and Labeling Expert Committee.[16] The committee will focus on: nomenclature regulations and policies; current marketplace products; labeling requirements; analytical chemistry; drug formulation; and regulatory requirements.

Verbal Medication Orders

Verbal drug orders have greater potential for error than written or electronic orders because of problems in interpreting what someone else is saying. Contributing factors include incomplete knowledge about the drugs, noise and distractions, or different pronunciations of drug names. In addition, verbal orders are then transcribed, introducing another route for errors. For example, a pharmacist may receive a call for a medication, which is based on a written transcription of a verbal order from a physician. Drug names and dosage numbers can be misinterpreted. Because of the potential for misinterpretation, the NCC MERP recommends that verbal medication orders be limited to urgent situations where written or electronic communication is not possible.[17] The NCC MERP recommends that health care organizations establish policies that describe situations when verbal orders may be used, who can send and receive orders, and what elements should be included for completeness.

Writing of Prescriptions

The Institute for Safe Medication Practices emphasizes that illegible prescriptions have resulted in injuries and harm to patients, e.g., a letter or number could be read or interpreted differently than intended.[18,19] Even computerized physician order entry may not eliminate all errors, because

computer-generated letters and numbers could be confused, for example, a lower case "l" letter with the number "1", the letter "O" with the number "0", and the letter "Z" with the number "2". The NCC MERP also recommends that all orders be written in the metric system, wherever possible. This convention will help reduce miscalculations when converting to the metric system, which is used for product labeling.

Other errors found have been in use of abbreviations and symbols, because they can be misunderstood (e.g., HCl has been confused for potassium chloride). The NCC MERP determined that any standardization of abbreviations would still not address the potential for error and misinterpretation. Lists of abbreviations that are potentially dangerous are available.[20,21] Ten-fold errors in the dosage and strength of medications have occurred because there is misinterpretation of the absence of a leading zero in front of a decimal expression less than one (e.g., .5 has been interpreted as 5), and the presence of a trailing zero in numbers greater than or equal to one (e.g., 5.0 has been interpreted as 50).

SUGGESTIONS FOR IMPROVING PATIENT SAFETY

The following suggestions can help to minimize errors in communication of drug orders:

Confusion over Drugs with Similar Names

1. If the institution/facility has a formulary, consider whether drugs that look alike or sound like are allowed. If allowed, identify these as being "high-risk" and add extra steps to assure accurate ordering, dispensing and administration.
2. If medications are stored in the office or hospital, label with both the generic and the brand name, if known.
3. Don't store drugs with similar names alphabetically. Instead, store them apart from each other or in different locations.
4. Provide both the generic and brand name in communications of drug orders.
5. Write the purpose for the medication on the prescription to help the pharmacist interpret the order accurately.
6. Provide patients with written information about their medications, including both brand and generic names.

Writing of Prescriptions

1. Write in block letters, using upper-case (not cursive).
2. Use the metric system (instead of the apothecary and avoirdupois systems).
3. Avoid use of abbreviations and Latin directions for use, e.g., q.i.d., b.i.d., and instead write it out, e.g., four times a day, twice a day.
4. Use a leading zero if a number is less than one (0.1), and don't use a trailing zero after a decimal (5.0).
5. Prescriptions should include: date; drug name; dosage; route of administration; frequency of administration; and signature and professional designation of authorized prescriber.
6. PRN orders should indicate a specific time interval.

Written Medication Orders

1. The institution/facility policy and procedure should identify authorized prescribers:
     - Non-physician prescribers (nurse practitioner, physician assistant) must verify that orders prescribed are within the scope of their written agreement.
     - A consulting physician may write an order with approval from an authorized prescriber of the service responsible for the patient.
     - Orders written by medical students (including sub-interns) should be countersigned by an authorized prescriber.
     - An institution/facility may allow a registered nurse to initiate certain orders without co-signature from an authorized prescriber, such as over-the-counter lozenges or reorder replacement supply of multiple dose medications previously ordered by an authorized prescriber (e.g., eyedrops).
2. Include all known patient allergies in admission and transfer orders. The designation "no known allergies" should be used as appropriate.
3. Use only approved abbreviations as specified in the institution/facility policy.
4. The institution/facility may have a policy on approved medication protocols that nurses may administer drugs as specified in the protocol. The institution/facility pharmacy should have a copy of the protocols and familiarize the pharmacists with the protocols.
5. Medication orders sheets should have the patient's name and other identification, such as hospital number, date of birth, etc.
6. Orders for medication should include: date and time ordered, drug name, dosage, route of administration, frequency of administration and signature and professional designation of authorized prescriber.
7. An existing order may not be corrected, altered added to or modified in any way.
8. If change is necessary, the order must be discontinued and a new order written by the authorized prescriber.
9. When discontinuing a medication, the prescriber should write the name of the drug being discontinued and not an order number.
10. Use a leading zero if a number is less than one (0.1), and don't use a trailing zero after a decimal (5.0).

Verbal Medication Orders

1. If there is an alternative, don't use verbal orders; instead use faxes, electronic mail or computerized physician order entry systems. Develop guidelines on the use of verbal orders, and who is authorized to provide and receive verbal orders.
2. If possible, have a second person listen to the verbal order, especially if the receiver is inexperienced. Verbal orders may need to be clarified by the pharmacist.
3. If verbal orders are used, the receiver should read back the order to confirm understanding.
4. Develop guidelines on what should be included in a verbal order. For example, elements could include the patient name, age and weight (if needed), both brand and generic drug name, dosage, strength or concentration, frequency, duration, purpose or indication, and instructions for use (if needed).
5. The person authorized to accept verbal orders records the verbal order directly onto the appropriate medication order sheet or enters the order electronically, writes the name of the prescriber and signs the order with his/her professional designation.

6. The prescriber should verify the verbal order in the patient's chart and sign such order within the timeframe as defined by the institution/facility. The individual institution/facility may include in their policy that no additional verbal orders will be accepted, providing no adverse consequences are anticipated for that patient, until outstanding verbal orders are signed by the prescriber.

Transcription and Verification of Medication Orders

1. The institution/facility should identify staff authorized to transcribe medication orders.
2. The registered nurse (RN) is responsible for checking orders transcribed by a non-RN for accuracy. The RN initials or countersigns the signature of the non-RN transcribing the order as part of the verification for accuracy.

MEDICATION ADMINISTRATION/DOCUMENTATION

1. Prior to administering any medication, the RN/LPN (licensed practical nurse) will:
   - Check that the initial transcription and verification has been completed by a RN.
   - Review the ordered medication with respect to desired outcome, therapeutic duplication, possible drug interactions allergies and adverse effects/toxicity.
   - Check the time, dose, and route of packaged medication against that transcribed on the institution/facility document and check the patient allergy.
   - Check the patient name band to verify patient identity.
2. Document medication administered on the appropriate documentation tool.
   - Never alter patient records. All corrections and late entries should be clearly marked as such.
   - Do not erase, obliterate, or attempt to edit notes previously written. Do not use correction fluid or tape.
   - Indicate errors by drawing a single line through the error, writing the word "error" above the error, and initialing the error.
   - Late entries, entries made out of time sequence, or addenda should be clearly marked as such in the record, properly dated noting time, and signed.
3. Document the evaluation of the patient response to the medication, when appropriate.
4. Document any identified possible adverse reaction to the medications administered.
5. Document explanation of any omitted doses.
6. Nurses are only permitted to administer medications for specific doses while the patient is hospitalized. Dispensing drugs by the nurse is not permitted by state and federal laws.
7. The institution/facility should have a policy on:
   - Medications that may not be administered by a LPN.
   - Drugs (such as insulin) requiring verification by a second nurse.
   - Drugs requiring an infusion pump.

Medication Events Reporting and Analysis[22]

1. Define a standard mechanism for identifying, reporting, and analyzing medication events as well as a flow diagram for communicating the event.

2. Include in the communication channel the office/committee on performance improvement/risk management and, if appropriate, the office of claims and litigation.
3. Define a system to address and manage an identified sentinel event.

For an example policy on Medication Event Reporting and Analysis, download the <u>Johns Hopkins Hospital Interdisciplinary Clinical Practice Manual with the Reporting and Analysis of Medication Errors Form</u>.[22]

This patient safety statement was developed by the AAO Quality of Care Secretariat in collaboration with the American Society of Ophthalmic Registered Nurses (ASORN) and the American Association of Eye and Ear Hospitals (AAEEH). The Academy, representing over 95% of practicing ophthalmologists in the United States, is committed to promoting high-quality eye care and its continuous improvement. ASORN and AAEEH are collaborative partners with the Academy's commitment to quality patient care and its ongoing quality of care activities. ASORN is a society of registered nurses whose mission is to foster excellence in ophthalmic patient care and to support the ophthalmic team through individual development, education, and evidence-based practice. AAEEH is composed of domestic and international institutions, which are dedicated to quality medicine, research, education and surgical excellence.

References

1. National Coordinating Council for Medication Error Reporting and Prevention. What is a Medication Error? Available at http://www.nccmerp.org/about-medication-errors. Accessed September 28, 2015.
2. U.S. Food and Drug Administration Available at http://www.fda.gov/drugs/drugsafety/medicationerrors/default.htm. Accessed September 28, 2015.
3. Medwatch: The FDA Safety Information and Adverse Events Reporting Program. Available at http://www.fda.gov/medwatch/index.html. Accessed September 28, 2015.
4. United States Pharmacopeia Medical Errors Reporting Program. Available at http://www.usp.org/usp-healthcare-professionals/medication-safety-labeling. Accessed September 28, 2015.
5. Institute for Safe Medication Practices. Available at http://www.ismp.org/. Accessed September 28, 2015.
6. Medication Error Study. Physician Insurers Association of America. Washington DC. June 1993.
7. Bettman JW: Seven hundred medicolegal cases in ophthalmology. Ophthalmology. 1990; 97:1379-84.Brick DC: Medication errors result in costly claims for ophthalmologists. Surv Ophthalmol 1995: 40:232-236. Available at http://www.omic.com/medication-errors-result-in-costly-claims-for-ophthalmologists/. Accessed September 28, 2015.
8. Mandal K, Fraser S: The Incidence of Prescribing Errors in an Eye Hospital. BMC Ophthalmology. 2005;5:4. doi:10.1186/1471-2415-5-4.
9. United States Pharmacopeia National Coordinating Council for Medication Error Reporting and Prevention Creates an Analysis Tool for Adverse Drug Events. Available at http://www.usp.org/news/national-coordinating-council-medication-error-reporting-and-prevention-creates-analysis-tool-adverse-drug-events. Accessed September 28, 2015.

10. National Ambulatory Medical Care Survey Summary of 1995-1996. Centers for Disease Control and Prevention. November, 1999. Available at http://www.cdc.gov/nchs/data/series/sr_13/sr13_142.pdf. Accessed September 28, 2015.
11. American Hospital Association. Available at http://www.aha.org/advocacy-issues/tools-resources/advisory/96-06/991207-quality-adv.shtml. Accessed September 28, 2015.
12. Summary of 1999 Information Submitted to MedMarx: A National Database for Hospital Medication Error Reporting. December, 2000.
13. Joint Commission for Healthcare Organizations Sentinel Event Alert: Look-alike, sound-alike drug names. Issue 19, May 2001. http://www.jointcommission.org/sentinel_event_alert_issue_19_look-alike_sound-alike_drug_names/
14. ISMP's List of Confused Drug Names. February 2015. http://www.ismp.org/Tools/confuseddrugnames.pdf
15. Institute of Medicine: To Err is Human - Building a Safer Health System. National Academy Press, 1999. http://iom.nationalacademies.org/Reports/1999/To-Err-is-Human-Building-A-Safer-Health-System.aspx
16. USP 2015-2020 Nomenclature and Labeling Expert Committee Work Plan. http://www.usp.org/council-experts-expert-committees-overview/nomenclature-and-labeling-expert-committee-work-plan
17. National Coordinating Council for Medication Error Reporting and Prevention: Recommendations to Reduce Medication Errors Associated with Verbal Medication Orders and Prescriptions. Adopted February 20, 2001. Revised February 24, 2006. http://www.nccmerp.org/recommendations-reduce-medication-errors-associated-verbal-medication-orders-and-prescriptions
18. Institute for Safe Medication Practices: ISMP's List of Error-Prone Abbreviations, Symbols and Dose Designations. https://www.ismp.org/tools/errorproneabbreviations.pdf
19. Institute for Safe Medication Practices: ISMP Medication Safety Alert! - Misidentification of Alphanumeric Symbols. June 5, 2014. https://www.ismp.org/newsletters/acutecare/showarticle.aspx?id=81
20. National Coordinating Council for Medication Error Reporting and Prevention: Recommendations to Enhance Accuracy of Prescription/Medication Order Writing. Adopted September 4, 1996. Revised October 22, 2014. http://www.nccmerp.org/recommendations-enhance-accuracy-prescription-writing
21. National Coordinating Council for Medication Error Reporting and Prevention: Dangerous Abbreviations. http://www.nccmerp.org/dangerous-abbreviations
22. Medication Events Analysis and Reporting in the Johns Hopkins Hospital Nursing Practice and Organization Manual. Volume II. Clinical section. Section III, protocols and procedures. Baltimore, The Johns Hopkins Hospital Department of Nursing, Draft 8/13/2001, MDU-000. Available at http://www.aao.org/asset.axd?ID=8E67D701-3FC5-4FD5-BA14-172C608949D4. Accessed September 28, 2015.

Approvals

AAEEH, ASORN, and AAO Quality of Care Secretariat, Hoskins Center for Quality Eye Care
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