SYNOPSIS

KEY POINT SUMMARY

OBJECTIVES

The objective of the study was to summarize the preliminary results of a nationwide, observational study of dispensing errors occurring in community-based and health system pharmacies. The authors attempted to determine a realistic estimate of the national error rate for the types of pharmacies studied. Additionally, this research gathered information regarding the frequency of specific error types, rather than reporting an overall error rate. Finally, the effects of semi-automated dispensing systems on errors, the identification of relationships between errors, and environmental and system design variables were explored, including lighting levels, sound levels, type of inspection system used (e.g., bar code product verification), and arrangement of drug stock.

Medication Dispensing Errors in Community Pharmacies: A Nationwide Study

Flynn, E. A., Dorris, N. T., Holman, G. T., Camahan, B. J., Barker, K. N

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Key Concepts/Context

The available literature concerning medication dispensing errors provides relatively few studies that focus on community-based pharmacies, as much of the available research regarding dispensing errors has been conducted in single pharmacies that are associated with hospitals and medical centers, largely due to convenience. Although the dispensing process may be essentially the same, the validity of extending these findings to community pharmacies has yet to be tested. One important difference between the hospital outpatient pharmacy setting and community pharmacies is the work environment, where staff are subjected to more distractions and interruptions than in the hospital setting by virtue of selling a wide variety of healthcare and miscellaneous items. This paper presents the results of a nationwide, observation-based study of dispensing errors. Although community-based pharmacies were the primary focus, a small number of health-system pharmacies were also included. Investigators collected information concerning the frequency and type of errors and near errors as well as data regarding a number of task and environmental factors previously correlated with dispensing errors.

Methods

Following an initial invitation, 50 pharmacies from six cities were randomly selected to participate in the study. While dispensing related errors were considered in the study, data was also collected regarding near-errors, which are defined as errors observed during the filling process that were discovered and corrected by the pharmacy staff prior to dispensing to customers. Errors observed during the study were categorized into two major groups: content and labeling errors. Information was also collected regarding the circumstances under which the errors and near errors were committed and detected. Researchers collected information

DESIGN IMPLICATIONS

Content errors associated with lighting levels in filling and inspection areas below 94 foot-candles. was noticeably less than the 146 foot-candles tested in another study manual inspection system. This suggests that lower lighting level standards may be acceptable in bar code product verification systems. However, the data associated with the errors and near errors would suggest that a lighting level brighter than 94 foot-candles significantly affects the overall dispensing accuracy. (Additional lighting guidance is available from the USP Section1066: Physical Environments That Promote Safe Medication Use.)

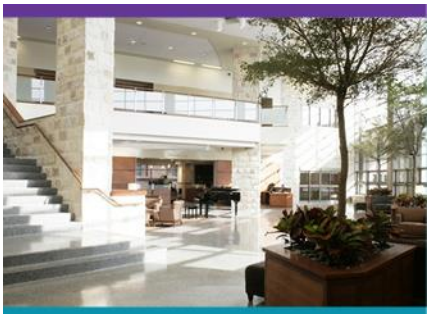
concerning the following independent variables: the lighting level associated with the prescription filling workstations, the prescription inspection area, the patient-counseling counter, and the drug storage area. The system for inspecting prescriptions was also recorded (i.e., bar code systems versus manual systems). Approximately half of the pharmacies were in the chain pharmacy category, 25 percent were independent pharmacies, and the remaining 25 percent were health-system pharmacies. Lighting levels were measured at all work stations and in the drug storage areas and sound levels were recorded for common sources of sound. Additional data regarding the prescription filling system and pharmacy design were collected at this time as well.

An undisguised observer technique was employed for data collection between June 2000 and April 2001. Every prescription filled while the investigator was present was inspected. Additionally, a sample of will-call prescriptions (filled before the arrival of the investigator and waiting to be picked up) were inspected. Investigators compared the physician's written order to the contents and label of each new prescription (patient presented a new prescription to the pharmacy staff). Any deviations from the prescribed order were noted as errors. All errors were confirmed and then corrected by an available pharmacist before the prescription was dispensed to a patient. Investigators observed a minimum of 100 prescriptions at each location.

Findings

A total of 5,784 prescriptions were inspected, revealing 91 errors (1.57%) and 74 near errors (1.28%). Errors were categorized as either content (41.76%) or labeling (58.24%) errors. Results are consistent with findings in the available literature. In particular, lighting levels, type of inspection system used (e.g., bar code product verification), number of available employees, and the arrangement of drug stock were significantly associated with both types of errors.

1. A significantly lower percentage of the mistakes (errors and near errors combined) were detected by pharmacy staff when the sound levels were above 75 dBA. When the ambient noise was a result of radio or television, which was the case 83% of the time, a significantly higher proportion (54%) of the errors were detected.
2. Statistical anlysist revealed that 68% of the content errors occurred in pharmacies with a lighting level below 94 foot-candles in the prescription filling area. A significant difference was found between the number of near errors occurring above and below 94 foot-candles. The average lighting level was significantly different for both labeling and content errors. Specifically, errors were found 35% of the time in pharmacies with inspection area lighting levels below 94 foot-candles and 54% when the level was above. The average lighting level associated with near errors was



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13.58 foot-candles brighter than the average associated with errors (a statistically significant difference).

3. The availability of bins to hold all of the prescriptions for an individual patient was found to have a significant effect on the percentage of mistakes caught by pharmacy staff (i.e., near errors). Thirty-five percent of mistakes were detected when bins where not available; however this increased to 55% when they were available.
4. Analysis determined that 213 of the content errors were committed in pharmacies where the drug stock was packed tightly on the shelves.
5. The arrangement of drug stock in each pharmacy was categorized based on whether brand name drugs were separated from their generic counterparts, and if the drug stock was grouped by form (e.g., tablets separated from ointments, eye drops, etc.), and although drug arrangement had no significant effect associated with errors, the percentage of mistakes detected by pharmacy staff was significantly higher when the drugs where stored alphabetically regardless of form

Limitations

The authors identified several limitations. Pharmacies that agreed to participate in this study may have felt they would have a low error rate, so the error rate determined in this study may represent the most accurate pharmacies. Further, the presence of the observer, as well as the feedback regarding errors committed may have influenced the error rates. Efforts to minimize the influence of the observer on the pharmacy staff included training the observers to be unobtrusive and nonjudgmental, but it is difficult to eliminate all effects of the observer.