

Review of Literature on Medication Errors

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Issues with Quantifying Medication Errors

- Varying definitions of medication errors – i.e., “inappropriate use of a drug whether or not harm occurs;” “medication errors that have the potential to produce harm;” “clinically significant errors that produce harm,” etc.
- Studies of medication errors also focus typically on one particular state of the medication use process (i.e., prescribing, dispensing, administering, monitoring, etc.)
- Incidence of medication errors depends on the type/methods used to detect errors (i.e., direct observation, chart review, computerized monitoring, voluntary reporting)
- Medication error rates are quoted in various ways (i.e., errors per order; per dose; per 1,000 patient administrations; per 1,000 patient days, etc.). ADE rates are also quoted in various ways.

Incidence of Medication Errors related to *administration* varies across settings:

- **Hospitals** (most extensive research) – rate of 2.4-11.1 errors per 100 doses administered. Causes of administration errors were most often related to: (1) lack of knowledge about the medication; (2) infusion pump/parenteral delivery problems; (3) memory lapses; (4) faulty drug identity checking; (5) faulty dose checking; (6) lack of information about the patient; (7) transcription errors. *Lack of access to information or lack of knowledge accounts for 78% of administration errors.*

A legal counsel website, Injuryboard.com, notes that medication errors are especially likely when nurses who are responsible for administering medications are repeatedly interrupted.

- **Nursing Homes** (some research on adverse drug events - ADEs incurred and a few studies on error rates at various stages of medication-use process; little known about errors of omission) – rate of 6-20 errors per 100 doses administered. Excluding wrong-time errors, omission of an ordered medication is the most common type of administration error in nursing homes.
- **Wrong time errors in nursing homes** is a significant problem in assisted living and nursing homes. In one study, an administration error rate of 27% in AL settings was reduced to 15% when a 4-hour interval was scheduled as opposed to a 2-hour interval for administration (Young et al 2005). In another nursing home study, administration errors were reduced from 35.6% to 6.7% when wrong time errors were excluded (Scott-Cawiezell et al 2005).

Significant Nursing Home Studies of Medication Errors due to Administration

- Study by Barker et al (2002) of 36 facilities (hospitals and nursing homes) used the medication administration error detection method used by CMS as a quality indicator. Excluding “wrong time errors,” the administration error rate averaged 19% (or nearly 1 of every 5 doses in the typical hospital and nursing home), and there were no statistically significant differences between hospitals and nursing home rates. Of the medication errors, about 7% were rated potentially harmful.
- A statewide study in North Carolina performed by the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill studies nursing home medication errors from January through September 2004. Of the 385 nursing homes that participated (100% of the nursing homes in the state!), there was a total of 10,920 errors reported during the 9 month period. Of these, 9,951 resulted in no harm to the residents (91%); 886 required monitoring/intervention (8%); 82 required ER visit/medical attention (0.08%); and 1 error contributed to permanent harm (less than 0.01%). Personnel involved in most medication errors were LPNs (54%) or RNs (29.4%) followed by pharmacists (6.9%), physicians (4.3%); patients (2.3%); and supportive personnel (2.1%).

To put the 10,920 errors in context, the researchers estimated that the average nursing home resident received 8.1 medications administered 2.1 times per day (2003 National Medication Usage study). For the approximately 47,000 nursing home beds in North Carolina, this translates to approximately 836,600 administrations of medications per day statewide. *On average, 40.5 medication errors are reported statewide per day which is a very small percent (only 0.005%) of medication administration opportunities.*

Possible causes of medication errors were also examined. “Human factors” and “communication” were listed as the main possible causes for medication errors accounting for over 93% of responses. High staff turnover, heavy use of agency nurses, understaffing, and lack of communication between staff were possible underlying factors explaining these causes.

Incidence of ADEs by setting published shows significantly lower rates in nursing homes:

- **Hospitals** – ADE rate of 2.4-6.5 per 100 admissions (estimated that 28-50% are preventable).
- **Nursing Homes** – ADE rate of 0.02-0.1 per 100 admissions (estimated that 42-51% are preventable). Errors associated with preventable ADEs were most likely to occur at monitoring stage (80% of ADEs) (Gurwitz et al 2005). In another study of a LTC facility, 68% of errors reported by nurses occurred at the administration stage (Handler et al 2004).
- A recent study by Boockvar et al (2004) found that a significant percent of ADEs occurred between transfer from the hospital to nursing home when a large percent of medication were discontinued or altered.

Underutilization and Overutilization of Medications (failure to prescribe medications for which there is an evidence base for reduction in morbidity and mortality):

- **Hospitals** – well-documented evidence of inadequate treatment for acute coronary syndromes, heart failure, chronic coronary disease, atrial fibrillation, bacterial infection prophylaxis, and thrombosis prophylaxis.
- **Nursing Homes and Assisted Living** – well-documented evidence of inadequate treatment for pain management, congestive heart failure, and use of anticoagulants in stroke prevention and atrial fibrillation. Limited evidence for deficits in use of medications for depression, myocardial infarction prophylaxis, and treatment for osteoporosis.
 - 45-80% of nursing home residents experience unrelieved pain (AGS, 2002)
 - 61% of nursing home residents with osteoporosis were not receiving calcium supplementation
- In both settings, overutilization of medication is best documented in treatment of colds, upper respiratory infections, and bronchitis with use of antibiotics.

Costs of Medication Errors

- Less research on costs of medication errors compared to study of incident rates.
- Few studies examined costs of ADEs in nursing homes.
- Our understanding of the cost of medication errors is very incomplete; most of what is known relates to additional health care costs associated with preventable ADEs caused by medication errors.
- Little is known regarding costs of medication errors that do not result in harm as well as “near misses.”
- **Hospitals**
 - After adjusting for comorbidities and case mix, the average additional length of hospital stay associated with a preventable ADE was 4.6 days. Projected out for a 700-bed hospital, preventable ADEs result in an additional costs of \$2.8 million per year.
 - Estimated costs of emergency room visits per preventable ADE is \$10,375 (Jha et al, 2001).
- **Nursing Homes**
 - Preventable ADEs in the average size nursing home cost up to \$171,000 per year per home (GAO, 2000).

Nurse Delegation of Medication Administration for Elders in Long-term Care Settings

- 1998 published results of their state pilot study mandated by the 1995 Washington State Legislature and approved by the Nurse Delegation Legislative Oversight Committee in 1996 (Young et al 1998). *This was the first systematic evaluation of nurse delegation in the US.*
 - Settings included assisted living, adult family homes, and residential settings for developmentally disabled persons
 - Respondents included nurses, nursing assistants, managers, consumers, and families
 - Of the 25,556 complaints to the Abuse and Neglect Hotline for all long-term care settings during the pilot two-year period, *only 13 cases (0.05%) involved nurse delegation issues.* There was no evidence of significant harm or adverse outcomes for consumers specifically related to nurse delegation.
 - *Reported benefits* included:
 - Increased involvement of RNs in care planning
 - Better preparation for nursing assistants with nurse delegation
 - Better communication with consumer and among the care team
 - Improvements in quality of care; better continuity of care
 - Less restrictive environments
 - Nurse delegation is new practice opportunity for nurses (increased use of professional judgment and discretion in determining what and to whom to delegate)
- 2002 published report – “State Assisted Living Policy: 2002” (Mollica, 2002) reported that 30 states (64%) allowed unlicensed assisted personnel who have completed training to administer medications. In 2000, only nine states permitted trained aides to administer medications.
 - In the 2002 report, 51% of the state licensing directors reported that state surveyors found numerous problems with medication errors, but *the frequency of the problems was not related to states’ policies on who is permitted to administer medications.*
- 2003 published study - “Nurse Delegation of Medication Administration for Elders in Assisted Living” (Reinhard et al 2003) compiled findings from current state policies and issues from perspectives of state nursing boards, AL administrators, and key professionals regarding nursing delegation of medication administration for elders in AL settings.
 - Interviewing state boards of nursing, there were concerns expressed that there is not enough training of medication aides, that nurses do not understand their responsibilities in delegation, or that aides may replace nurses (these are in states permitting medication aides). Despite these concerns, *few stated there is any evidence of harm to residents in AL in relation to medication administration by trained aides.* No data systems are in place to collect this data, so comments are anecdotal. It is also important to note that most boards of nursing are not familiar with AL or their policies.

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