

Nurses' Perceptions of and Experiences with Medication Errors



By

Mary Jo Maurer PhD, RN, CNS

Acknowledgements

Chairperson:

James H. Price, PhD, MPH

Committee:

Joseph A. Dake, PhD, MPH

Timothy R. Jordan, PhD, MEd

Jane Ransom, PhD, RN

Introduction

- *To Err Is Human: Building a Safer Health System (IOM, 2000)*
 - ◆ *Errors in acute care setting are the leading cause of death (n=98,000) and injury in this setting*
 - ◆ *1 out of 3 ADE occurred by nurse administration of medications (Peppers, 1995)*
 - ◆ *Errors highest at transition points*

Significance of the Problem

- 2% pt. admissions experienced preventable ADE
- Increased costs app. \$4700/admission or \$2.8 million annually in one acute care setting
- Costing nation \$2 billion per year
(Bates et al., 1997)

Significance of the Problem

- 2.43 admissions per 100 complicated by an ADE
- Increased LOS 1.91 day
- Increased costs \$2,262

(Classen, Pestotnik, Evans, Lloyd & Burke, 1997)

Significance of the Problem

- The National Response to errors in health care included:

Agency for Healthcare Research and Quality (AHRQ)

National Patient Safety Goals (NPSGs)

Methods

Selection of Participants

- Members of the American Nurses Association (148,000)
- Computer randomized sample of 5,000 names and addresses
- 800 participants randomly selected- taking every 6th name from across the file

Selection of Participants

- Participation was voluntary (returned survey)
- A priori power analysis- 5% sampling error, 50/50 split, 95% confidence interval (need 384 returns)
- 800 surveys mailed to ensure adequate number of returns

Selection of Participants

- 84 undeliverable
- 27 not useable (no longer working, not working in nursing, retired)
- Response rate 49% (341/689)

Survey Instrument Development

- Four page booklet format
- Comprehensive review of literature
(face validity)
- Items constructed using Haddon Matrix
as organizing model

Survey Instrument Development

Measures:

1. Factors contributing to medication errors (13 questions)
2. Experiences with medication errors (4 questions)
3. Barriers to reporting (9 questions)
4. Factors increasing likelihood of reporting (8 questions)

Survey Instrument Development

5. Communication of medication errors
(3 questions)
6. Helpfulness of technology
(4 questions)
7. Demographics and characteristics
(17 questions)

Instrument Testing

- ***Content validity:*** reviewed by 4 experts, (2) survey research, (2) nursing research

Minor modifications were made based on the comments received

- ***Stability reliability:*** N=9, on 2 occasions 2 weeks apart, Northwest Ohio

Stability Reliability and Consistency Reliability

| Item or Subscale | Number of Items | Test – Retest* | Cronbach Alpha** |
|---|--------------------|-------------------|---------------------|
| Causes of Medication Errors | 12 | .78 | .85 |
| Barriers to Reporting | 8 | .77 | .87 |
| Factors Likely to Increase Reporting | 7 | .79 | .84 |
| Communication of Errors | 3 | .99 | .77 |
| Technology Utilized to Decrease Errors | 4 | .63 | .75 |

*N = 9

**N = 341

Data Collection

- Approval obtained from the University of Toledo Institutional Review Board
- Three wave mailing was done
- **Wave 1:** Survey on blue colored paper, personalized hand-signed cover letter explaining purpose of study, self addressed stamped return envelope, one-dollar incentive

Data Collection

- ***Wave 2:*** Two- weeks after first, cover letter, survey, and self addressed stamped envelope
- ***Wave 3:*** Postcard reminder, 2 weeks after second wave

Data Analyses

| Statistical Test | Hypotheses |
|---|---|
| Independent t tests | 1.1, 1.2, 1.5, 1.6, 1.9, 1.10, 1.11 1.12, 1.15, 1.17, 1.18, 1.21, 1.22 2.2, 2.5, 2.7, 3.2, 3.5, 3.7 |
| Analysis of variance (ANOVA) | 1.3, 1.4, 1.13, 1.14, 1.19, 1.20, 2.1 2.3, 2.4, 2.6, 3.1, 3.3, 3.4, 3.6 |
| Percentages | 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 5.4 |

Results

Demographics and Characteristics

| | |
|------------------------------|---------------------|
| Female | 93% |
| 25-75 years of age | M = 48 (50-59, 41%) |
| White | 82% |
| Advanced Degree | 61% |
| National Certification | 55% |
| Years of Clinical Experience | 1-49 yrs, M = 20 |
| Full-time | 86% |
| Over 12 hours per day | 32% |

Demographics and Characteristics

| | |
|---|-----|
| Same clinical practice setting | 74% |
| Formal pharmacology course | 62% |
| Pharmacology CE | 51% |
| Mathematical skills not tested or > 5 years | 50% |

Primary Causes of Medication Errors

| ITEM | Never / Rarely N (%) | Sometimes N (%) | Most / Always N (%) |
|---|---------------------------------|----------------------------|--------------------------------|
| Interruption during medication pass. | 37 (10.8) | 154 (45.2) | 148 (43.4) |
| Short RN staff. | 72 (21.1) | 148 (43.4) | 120 (35.2) |
| Nurse caring for high acuity patients. | 64 (18.8) | 160 (46.9) | 115 (33.7) |
| Nurse works more than 12 hours in one shift. | 108 (31.7) | 150 (44.0) | 82 (24.0) |
| Nurse knowledge of medication being administered. | 60 (17.6) | 203 (59.5) | 78 (22.9) |

Nurses Experience With Medication Errors over 12 months

| Medication errors over 12 months that: | Number of Errors | | | |
|---|------------------------------|-----------------------------|-----------------------------|-----------------------------|
| | 0 | 1 | 2-3 | 4 or > |
| Caused HARM to patients | N(%) 254 (74.5) | N(%) 43 (12.6) | | N(%) 38 (11.2) |
| that Did Not Cause Harm to patients | N(%) 129 (37.8) | N(%) 65 (19.1) | N(%) 73 (21.4) | N(%) 66 (19.4) |

N= varies 333-335 due to missing data

Nurse Characteristics and Medication Errors

- National certification
- Yrs. of clinical experience
- Pharmacology CE < 2 yrs. ago
- Formal pharmacology vs. integrated
- Full time versus not full time
- Day, night, rotating shifts

Nurse Characteristics and Medication Errors

- Mathematical skills tested within past 2 years
- Consistent clinical practice setting
- Size of hospital
- Work > 12 hours/day in a two week period

Results of Nurse Characteristics

- Hypothesis 1.18

“did not cause harm”, consistent clinical practice setting (M=2.34;SD= 2.98) versus nurses working in a variety of areas (M=1.49;SD=2.65)

(t= -2.181, df= 317, p=.03)

Results of Nurse Characteristics

- Hypothesis 1.21

Cause harm, worked > 12 hrs/day in 2 week period (M=0.56;SD= 1.13) versus those who did not work > 12 hours/day in a 2 week period (M=0.36;SD= 0.84)

(t=-2.414, df 218, p= .02)

Results of Nurse Characteristics

- Hypothesis 1.22

“did not cause harm”, worked >12 hrs/day in 2 week period (M=2.18;SD=2.53) versus those who did not work >12 hrs/day in a 2 week period (M=2.11;SD=3.24)

(t=-2.255, df 286, p=.03)

Perceived Barriers to Reporting Medication Errors

| ITEM | Total N (%) | Major Barrier N(%) | Moderate Barrier N(%) | Minor Barrier N(%) | Not A Barrier N(%) |
|--|--------------------|-------------------------------|----------------------------------|-------------------------------|-------------------------------|
| Nurses are afraid of the consequences that may result if they report a medication error. | 100 (29.3) | 108 (31.7) | 85 (24.9) | 40 (11.7) | |
| If something happens to the patient due to a medication error, the nurse will be blamed. | 96 (28.2) | 122 (35.8) | 70 (20.5) | 42 (12.3) | |
| Nurses are afraid of a reprimand if they report a medication error that is made. | 95 (27.9) | 115 (33.7) | 82 (24) | 43 (12.6) | |

Results/Number of Barriers

- Level of education (Associates, Bachelors, advanced degree)
- National certification
- Years of clinical experience
- Size of hospital (small, medium, large)
- Consistent practice setting
- Age of nurse
- Gender

Factors Increasing Chance of Reporting Medication Errors

| ITEM | Highly Likely/ Likely N (%) | Undecided N (%) | Unlikely/ Highly Unlikely N (%) |
|---|--|----------------------------|--|
| If the patient was harmed or potentially could have been. | 311 (91.2) | 15 (4.4) | 8 (2.4) |
| If there are benefits to reporting such as the prevention of future errors, improved practice, or increased accountability. | 309 (90.6) | 13 (3.8) | 15 (4.4) |
| If the nurse had no fear of retaliation in the work environment. | 303 (88.8) | 19 (5.6) | 14 (4.1) |

Factors Increasing Chance of Reporting Medication Errors

| ITEM | Highly Likely/ Likely N (%) | Undecided N (%) | Unlikely/ Highly Unlikely N (%) |
|---|--|----------------------------|--|
| If the nurse had a positive relationship with the supervisor/clinical manager. | 292 (85.6) | 29 (8.5) | 17 (5.0) |
| If the nurse had positive professional relationships with physicians on the unit. | 283 (83.0) | 30 (8.8) | 24 (7.1) |

Results/Number of Factors Likely to Increase Reporting

- Level of education
- National certification
- Years of clinical experience
- Size of hospital
- Consistent practice setting
- Age of nurse
- Gender of nurse

Communication of Medication Errors

| ITEM | Strongly Agree Agree N (%) | Undecided N (%) | Disagree Strongly Disagree N (%) |
|--|----------------------------------|--------------------|---|
| Communicated to the patient | 239 (70.1) | 79 (23.2) | 20 (5.9) |
| Communicated to the family | 235 (68.9) | 81 (23.8) | 22 (6.5) |
| Report card published for public to review | 198 (58.1) | 89 (26.1) | 48 (14.0) |

Perception of Medication Technology Decreasing Errors

| ITEM | Very Helpful/ Helpful N (%) | Slightly Helpful N (%) | Not Helpful at All N (%) | Not Sure N (%) | Do Not Have This N (%) |
|---------------------------------|--|---------------------------------------|---|-------------------------------|---|
| “Smart infusion pumps” | 218 (63.9) | 25 (7.3) | 6 (1.8) | 19 (5.6) | 67 (19.6) |
| Automated medication dispensing | 205 (60.1) | 38 (11.1) | 7 (2.1) | 12 (3.5) | 74 (21.7) |

Perception of Medication Technology Decreasing Errors (continued)

| ITEM | Very Helpful/ Helpful N (%) | Slightly Helpful N (%) | Not Helpful at All N (%) | Not Sure N (%) | Do Not Have This N (%) |
|---------------------------------------|--|-------------------------------------|--|-----------------------------|--|
| Computerized physician order entry | 188 (55.2) | 19 (5.6) | 2 (0.6) | 8 (2.3) | 119 (34.9) |
| Barcode medication administration | 169 (49.5) | 18 (5.3) | 6 (1.8) | 10 (2.9) | 133 (39) |

“Feelings of Safety”

- Three-fourths of nurses strongly agreed/agreed, they would feel safe as a patient in the hospital where they worked.

Implications and Recommendations

1. Allowing nurses to work over 12 hours in one day, whether voluntary or involuntary could have potentially serious consequences for patients.
2. Nurses perceive RN staffing levels and caring for higher acuity patients increases the likelihood of errors.

Implications and Recommendations

3. A positive socio-cultural atmosphere appears to improve reporting.
4. Nurses support open communication of errors to patients, families and the public, but want to be allowed to participate in the process.

Limitations

- Monothematic nature of survey may have caused response bias
- The further the return rate is from 100% the greater the threat to external validity
- Self reported data/socially desirable responses
- Cross sectional nature of the survey
- High number of nurses with advanced degrees

QUESTIONS ?