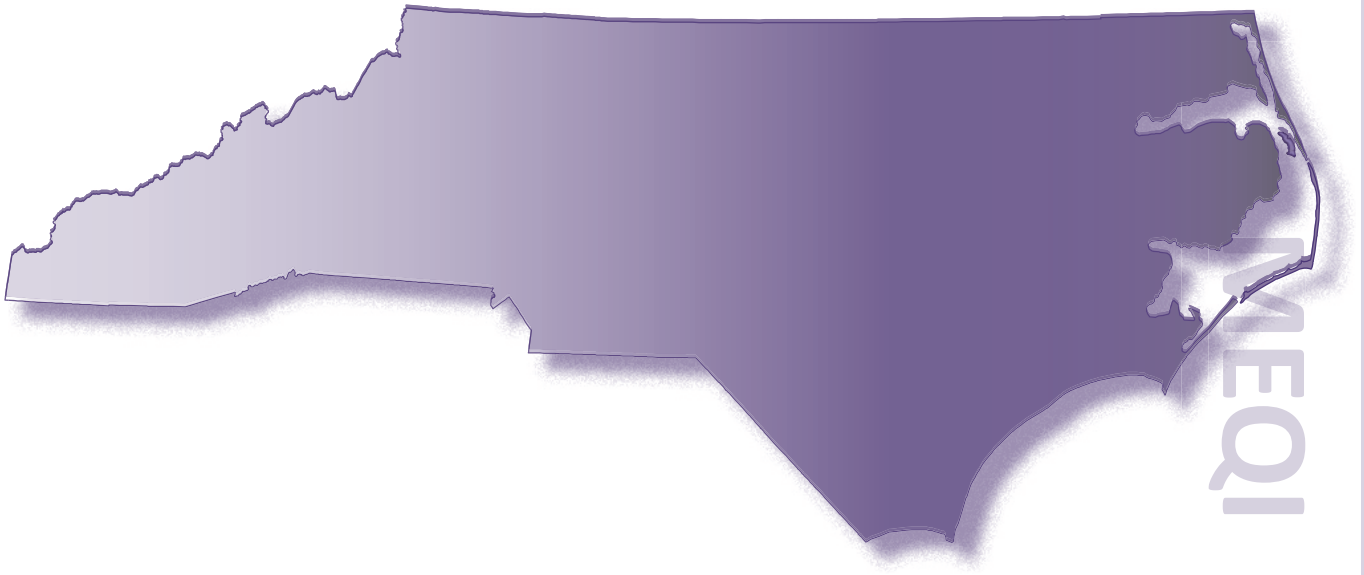
Nursing Home Medication Error Quality Initiative

MEQI Report: Year Five

October 1, 2007 to September 30, 2008



A report on the fifth year of mandatory reporting of medication errors for all state licensed nursing homes in North Carolina.

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MEQI

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MEQI Overview

The Medication Error Quality Initiative (MEQI) has now collected a fifth year of medication errors reports from licensed nursing homes in North Carolina. Nursing homes in North Carolina are required by law (Senate Bill 1016) to report all actual and potential medication errors. Data have been successfully submitted for 100% of facilities that were open and functional during this time

For the first three years, sites utilized an online annual summary reporting format, submitting summary data for one year at a time—this system is referred to as MEQI-Annual Report or MEQI-AR. During the last two reporting years access to an improved interactive online individual incident reporting system was made available as an option to all sites—this system is referred to as MEQI-Individual Error or MEQI-IE. MEQI-IE provides greater functionality and access to data for the nursing home staff, and provides more detailed and useful data. During the fifth reporting year 288 of 393 sites (73%) used the MEQI-IE System, while 105 sites (27%) continued to use MEQI-AR (See **Table 1** and **Table 2** for additional summary data). Beginning October 1, 2008 all sites transitioned to MEQI-IE.

Table 1. MEQI Summary Results (10-1-07 to 9-30-08)

Summary	MEQI-AR Error Report	MEQI-IE Error Report	MEQI-IE Repeat Occurrence
TOTAL ERRORS	4,104	8,979	44,982
NUMBER OF SITES	105	288	288
MEAN (AVERAGE PER SITE)	39	31	156
MEDIAN PER SITE	20	19	83
ERRORS PER 100 BEDS	33	26	130

MEQI-AR errors are entered in summary form. Repeat errors are not reported consistently in MEQI-AR. MEQI-IE errors are submitted as individual "error reports" that describe a distinct error. When MEQI-IE error reports are submitted sites are asked to indicate the number of times the error is repeated. An example would be an incorrect dosage of a once daily medication (1 error report) that is given incorrectly for four additional days before noticed (error was repeated 4 additional times). This would be included above as a total of 5 repeat occurrences

Important reporting notification: Due to the positive response of nursing homes to the new MEQI-IE system, the Sheps Center will no longer offer summary reporting using MEQI-AR. Beginning October 1, 2008 all NC licensed nursing homes report medication errors throughout the year using the MEQI-IE system. We recommend that sites submit errors at least monthly to avoid a backlog of error entry. In October nursing homes will submit an online confirmation that all errors have been reported, but no data summary will be required as individual errors will already have been entered into the system. If a nursing home's errors have not been entered by October, they will be required to enter all errors at that time. This is the first year that no summary reporting will be available. Contact MEQI staff if you need assistance with this change (see back page for contact information).

Error Outcomes

In year 5 of the project 91.7 % of the errors were reported in one of the less serious categories (Impact 1-3) while 8.3% of the errors were considered serious (Impact 4-9). The percentage of serious errors was very similar in both systems, with those sites using the MEQI-AR system reporting that 8.7% of their errors were serious and MEQI-IE sites reporting 8.1%. It is likely that some MEQI-AR sites include repeat errors in their summary data which would account for the slightly higher percentage than in MEQI-IE where they are counted separately. As in past years, there were very few reported error incidents that result in patient harm—only 132 for the entire state. With 393 nursing homes reporting errors, this is approximately 1 error resulting in harm per 3 nursing homes. This is a small number compared to the significant potential for medication errors in nursing homes, as each resident receives many doses of medication per day. In **Table 3** there are some notable differences between the residents affected by error in the MEQI-AR and MEQI-IE systems. Compared with MEQI-AR sites, MEQI-IE sites reported more errors among younger residents aged 64 or younger (16.3% to 6.1%), more errors among male residents(30.2% to 21.2%), and more errors among residents able to direct their own care(30% to 24.1%). The reasons for these differences are unknown.

Table 2. Medication Error Outcome/Impact on Resident (10-1-07 to 9-30-08)

Impact/Outcome	# MEQI-AR error reports	% MEQI-AR error reports	# MEQI-IE error reports	% MEQI-IE error reports	# MEQI-IE repeat occurrence	% MEQI-IE repeat occurrence
Impact 1: Capacity to cause error (no patient involved)	128	3.2%	187	2.1%	785	1.8%
Impact 2: Error did not reach the patient	577	14.4%	1,245	13.9%	3,636	8.1%
Impact 3: Error reached but did not harm the patient	2960	73.7%	6,822	75.9%	36,965	82.2%
Impact 4: Required monitoring / intervention to preclude harm	279	7.0%	662	7.4%	3,221	7.1%
Impact 5: Resulted in temporary patient harm	60	1.5%	45	0.5%	327	0.7%
Impact 6: Resulted in temporary harm, required trip to ER	7	0.2%	18	0.2%	48	0.1%
Impact 7: Contributed to permanent patient harm	1	0.0%	0	0.0%	0	0.0%
Impact 8: Intervention necessary to sustain patient's life	1	0.0%	0	0.0%	0	0.0%
Impact 9: Contributed to patient's death	0	0.0%	0	0.0%	0	0.0%

Resident Characteristics

Table 3. Characteristics of Population Affected by Medication Errors (10-1-07 to 9-30-08)

Age	**Percentage AR errors n = 4014**	**Percentage IE errors n = 8979**
64 years or younger	6.1%	16.3%
65-79 years	35.2%	31.0%
80 years or older	55.5%	50.6%
Not applicable (no resident involved - Impact #1)	3.2%	2.1%
Gender	**AR errors**	**IE errors**
Male	21.2%	30.2%
Female	75.6%	67.7%
Not applicable (no resident involved - Impact #1)	3.2%	2.1%
Resident Ability	**AR errors**	**IE errors**
Resident Able to Direct Own Care	24.1%	30.0%
Resident Unable to Direct Own Care	71.1%	64.3%
Not applicable, no resident involved or unknown	4.8%	5.7%

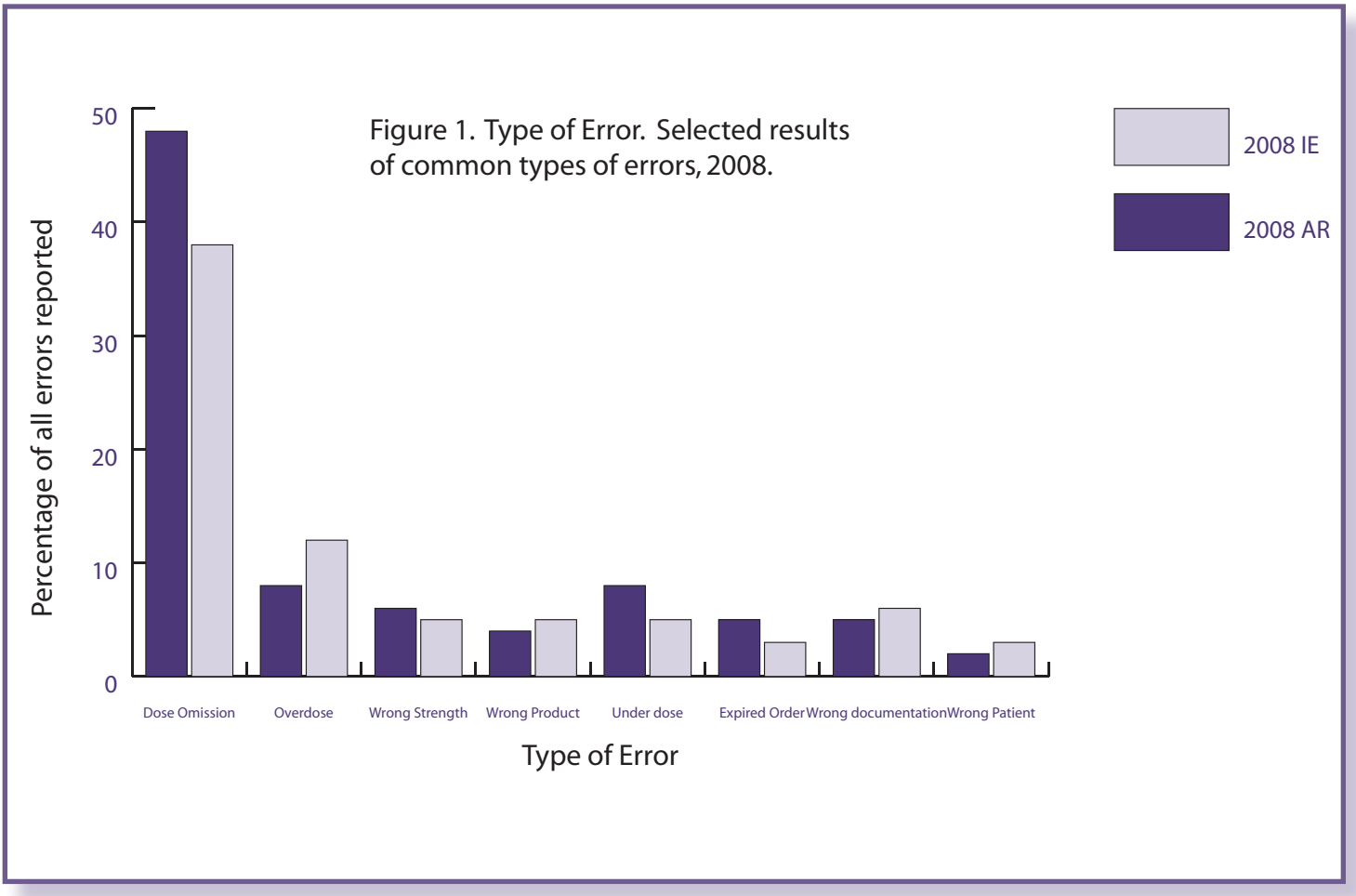
Liability Claims

During year 5 only one nursing home indicated that there was a liability claim against their facility related to a medication related error

Primary Types of Error

Each site reports a primary type of error for each error incident submitted (**Table 4**). For Year 5 the most common types of errors were dose omission, overdose/multiple dose, under dose, wrong product strength, expired order, wrong documentation and wrong product. These types of error have consistently been the most common during all five reporting years. As sites have converted to the MEQI-IE system the number of dose omission error reports has declined, most likely due to some MEQI-AR sites reporting repeat error incidents as individual errors. An example of a repeat error would be a resident's chart does not get updated with a new prescription and the patient misses 5 days of a new medication. In MEQI-IE this would be submitted as one error report (one dose omission) and the site would also indicate the number of times the error was repeated as 4, for a total of 5 repeat occurrences. MEQI-AR sites were asked to report this as one error, but some may have reported this as 5 separate errors. In 2008 errors reported with serious impact are still most often dose omission (27.6%) and overdose/multiple dose (21.7%), but the third and fourth most common cause of serious errors are wrong patient(12.0%) and wrong product(8.4%).

Figure 1 below provides a comparison of the most common types of error for both systems during the reporting year for the most common types of error.



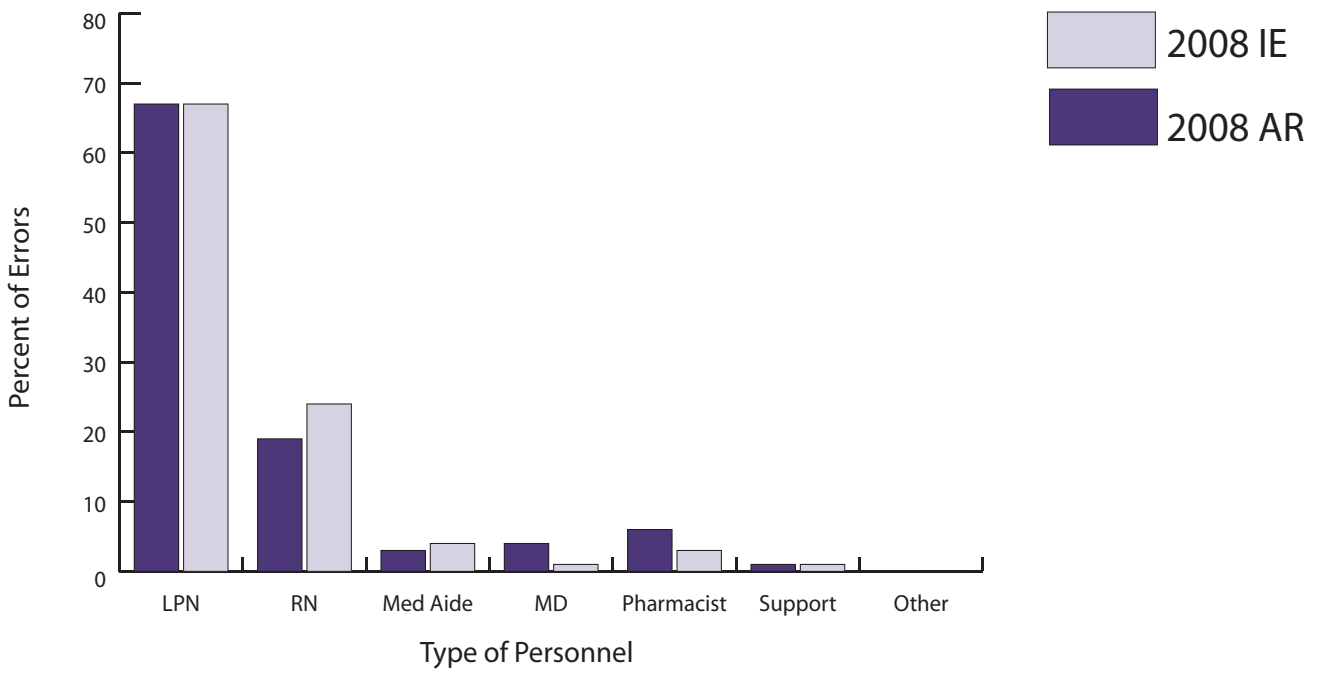
Primary Types of Error

Table 4. Primary Types of Error (10-1-07 to 9-30-08)

Primary Types of Error	% MEQI-AR n=4014	% MEQI-IE n=8979	% MEQI-IE Impact 1-3 Minor n=8254	% MEQI-IE Impact 4-9 Serious n=725
Dose omission	47.9%	38.2%	39.2%	27.6%
Overdose/multiple dose	8.3%	11.9%	11.0%	**21.7%**
Under dose	8.0%	5.0%	5.0%	5.2%
Wrong product strength	6.1%	5.3%	5.3%	5.2%
Expired order	4.9%	2.6%	2.7%	2.1%
Wrong documentation	4.7%	5.9%	6.1%	3.2%
Wrong product	4.2%	4.9%	4.6%	**8.4**%
Wrong time	3.9%	3.3%	3.3%	2.9%
Wrong patient	2.3%	4.0%	3.3%	**12.0**%
Wrong duration	1.4%	1.7%	1.8%	0.8%
Monitoring error	1.2%	0.9%	0.9%	0.8%
Labwork error	1.0%	0.9%	0.8%	**2.5%**
Wrong technique	0.9%	0.6%	0.6%	0.4%
Wrong form of product	0.8%	0.5%	0.4%	0.7%
Expired product	0.3%	0.1%	0.2%	0.0%
Wrong rate of administration	0.2%	0.2%	0.2%	0.1%
Wrong route	0.1%	0.2%	0.1%	**0.7**%
Other	3.8%	13.8%	14.5%	5.7%

Personnel Involved

Figure 2. Personnel Involved in Error, 2008



Licensed practical nurses and registered nurses combined are involved in most of the submitted medication errors (91% in MEQI-IE and 85.7% in MEQI-AR). This is not surprising as nurses provide almost all direct care on site in the nursing home and other providers (such as physicians and pharmacists) are located off-site. Errors at off-site locations are often only noted in the medication error reporting system if they have bypassed several safety checks and reached the nursing level. Data analysis to date does not show a significant relationship between personnel and seriousness of error outcome.

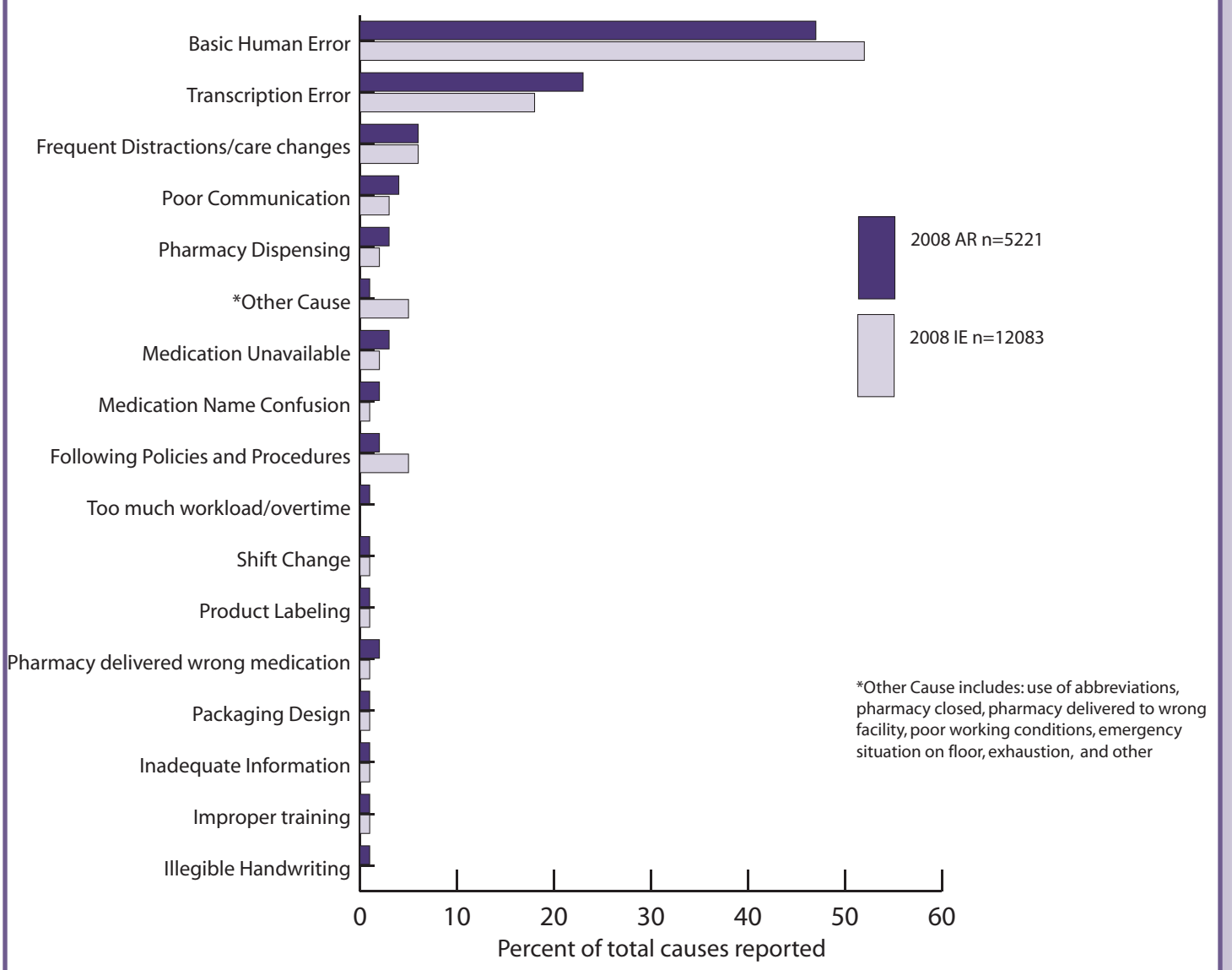
From 2007 to 2008 we have seen a decrease in the number of errors attributed to the pharmacist. In addition we are seeing an increase in errors attributed to medication aides. This type of personnel is new to NC and as more facilities use medication aides we anticipate an increase in the number of errors attributable to this part of the work force. This year 151 (38%) sites reported that they were using medication aides, with 604 of total aides reported (20 sites reported only using these for assisted living, 15 used aides for both skilled nursing and assisted living and 116 sites used only for skilled nursing). Training is different for the aides depending on location; 403 of the medication aides were reported to be trained to work in skilled nursing sites.

Sites using MEQI-IE also report secondary personnel involved in error and record if the primary personnel involved is temporary staff (agency or contract worker). Temporary personnel account for 3.6% of all errors and 7.0% of serious errors. While the actual numbers of errors is low this is an area that we will continue to monitor as more data are collected.

Possible Causes

Nursing homes also report on the possible causes for each error incident, and can select all causes involved. Basic Human Error continues to be the cause most often cited, accounting for approximately half of reported errors. The category of basic human error is a broad catch-all that includes forgetfulness, making a mistake, or doing something incorrectly with no identified cause. As the MEQI systems are improved over time there will be changes to this question to further investigate underlying causes of this human error to identify areas where patient safety improvement can be made. Transcription error is the next most commonly cited cause, accounting for 20% of errors. Transcription errors can include those where the medication is written incorrectly in the chart, or the medication administration is not correctly noted in the Medication Administration Record (MAR). Communication, pharmacy dispensing, medication unavailable, medication name confusion and following policies and procedures continue to be causes for many error incidents.

Figure 3. Cause of Error, 2008



Medications

Table 5. MEQI-AR. Common Medications Involved In Error (10-1-07 to 9-30-08)

Active Ingredient Name	# of errors
WARFARIN	149
DIGOXIN	115
INSULIN	106
LORAZEPAM	97
ASPIRIN	95
BUSPIRONE	91
FUROSEMIDE	72
HYDROCODONE (and combinations)	68
OXYCODONE (and combinations)	60
LEVOTHYROXINE	53
FEXOFENADINE	52
CALCIUM	48
VITAMINS	47
ALPRAZOLAM	45
VALSARTAN AND HYDROCHLORTHIAZIDE	45
FENTANYL	44
METOPROLOL	39
PANTOPRAZOLE	38
ZOLPIDEM	34
DILTIAZEM	33

Table 6. MEQI-IE. Common Medications Involved In Error (10-1-07 to 9-30-08)

Active Ingredient Name	# of errors
WARFARIN	462
INSULIN	396
LORAZEPAM	372
HYDROCODONE (and combinations)	343
OXYCODONE (and combinations)	302
FENTANYL	258
FUROSEMIDE	193
ALPRAZOLAM	161
MORPHINE	126
POTASSIUM CHLORIDE	115
METOPROLOL	109
ENOXAPARIN	80
QUETIAPINE	79
LISINOPRIL	53
DONEPEZIL	52
DIVALPROEX	49
PROPOXYPHENE	49
PHENYTOIN	40
PHENOBARBITAL	37
HALOPERIDOL	22

Other Error Characteristics

Phase of Error

Table 7. Phase of Error	MEQI-AR 2008	MEQI-IE 2008
Prescribing	2.3%	1.7%
Dispensing (Pharmacy)	7.5%	7.6%
Documentation	38.9%	43.1%
Administering	49.5%	45.7%
Monitoring	1.8%	1.9%

Number of Medications Taken Daily by Residents

For 35% of all MEQI-IE error reports, nursing homes voluntarily record the number of medications taken by the resident at the time of error. Forty percent reported the resident taking 1-10 medications per day, with 37% reporting 11-15, and 23% reporting 16 or more.

Shift of Error

Table 8. Shift of Error	MEQI-AR 2008	MEQI-IE 2008	MEQI-IE Serious 2008
7 am to 3 pm (day shift)	53.6%	53.5%	48.6%
3 pm to 11 pm (evening shift)	37.8%	37.4%	40.8%
11pm to 7 am (night shift)	8.6%	9.1%	10.6%

Errors in Transition

Nursing homes using MEQI-IE are asked if the errors occur during a transition from a home, hospital or other facility as this is a time when errors are more likely to occur. For 2008 a total of 894 (10%) of reported error incidents were recorded as having occurred in transition. Of these 894 errors, 46 occurred during a transition from a home, 815 from a hospital, and 33 from another facility. One hundred of the transition errors (14%) were serious errors (outcome 4-9). Of these serious errors, 8 were associated with transitions from home, 89 related to transitions from hospitals, and 3 were transitions from other facilities.

Effects

Data are also collected on the type of effects caused by the medication error. Most MEQI-IE errors (80%) cause no injury. The second most common category is other effect (11%) as nursing homes detail their effect in text rather than select a checked box, even when the same effect is provided in a list. Inadequate effect (6%), change in blood sugar (1%), excessive side effects (1%) and somnolence (1%) are also often reported. Effects tend to be reported in conjunction with serious errors, and are often specific to a particular type of medication (e.g. insulin errors cause change in blood sugar).

Discussion

Data Comparisons & Discussion

The total number of reported error incidents has been declining over time as additional sites convert to MEQI-IE. The median number of error reports per nursing home stayed the same in year 2 and year 3 when sites were using the MEQI-AR system (first year was only 9 months so is not included). Once the MEQI-IE system was introduced and adopted by a large percentage of sites, the median number of errors declined for all sites in year 4 and is up again slightly in year 5 in both systems (**Table 9**). The decline in total number of errors, but increase in the mean and median number of errors is likely a reflection of the increase in adoption of the MEQI-IE system, where repeat errors are not accounted for in the total number of errors.

Table 9. Total Errors, 2005-2008

Year	2005(year 2)	2006 (year 3)	2007 (year 4)	2008 (year 5)
Total Errors	16,106	15,776	13,551	12,993
median (AR)	22	22	19	20
median (IE)	NA	NA	18	19

Many nursing homes have now reported using MEQI-IE for two years, as 203 homes reported in 2007 and 288 homes in 2008, providing comparisons over time. In 2007 there was a median of 73 repeat error occurrences per nursing home, compared to 83 in 2008. In 2007 there was a median of 18 error reports per facility, and in 2008 a median of 19 error reports. Both these numbers show a slight increase over last year. Those sites who continued to use MEQI-AR, 190 in 2007 and 105 in 2008 submitted a median of 19 and 20 errors respectively-again a slight increase. Combining data from both MEQI-AR and MEQI-IE the rate of errors per 100 beds was 15.8 error reports per each 100 beds in 2007 and 16.4 error reports per 100 beds in 2008.(**Figure 4, Figure 5**)

With all sites using one reporting system in 2009 (Year 6) reporting will become more consistent and the results will be easier to interpret. This in turn will allow the identification of error characteristics that may benefit from improvement.

Data Limitations

- Self-report by all sites
- Self-selection into MEQI-IE system
- MEQI-AR sites might include repeats as separate errors
- Submitted data are not validated.
- Structured data form may miss important information about the errors.
- Fear of reporting might leave some errors unreported.
- Lack of technological expertise/ computer support can lead to incorrect data submission.

MEQI Data Comparisons

Figure 4. Median Error, 2007 and 2008

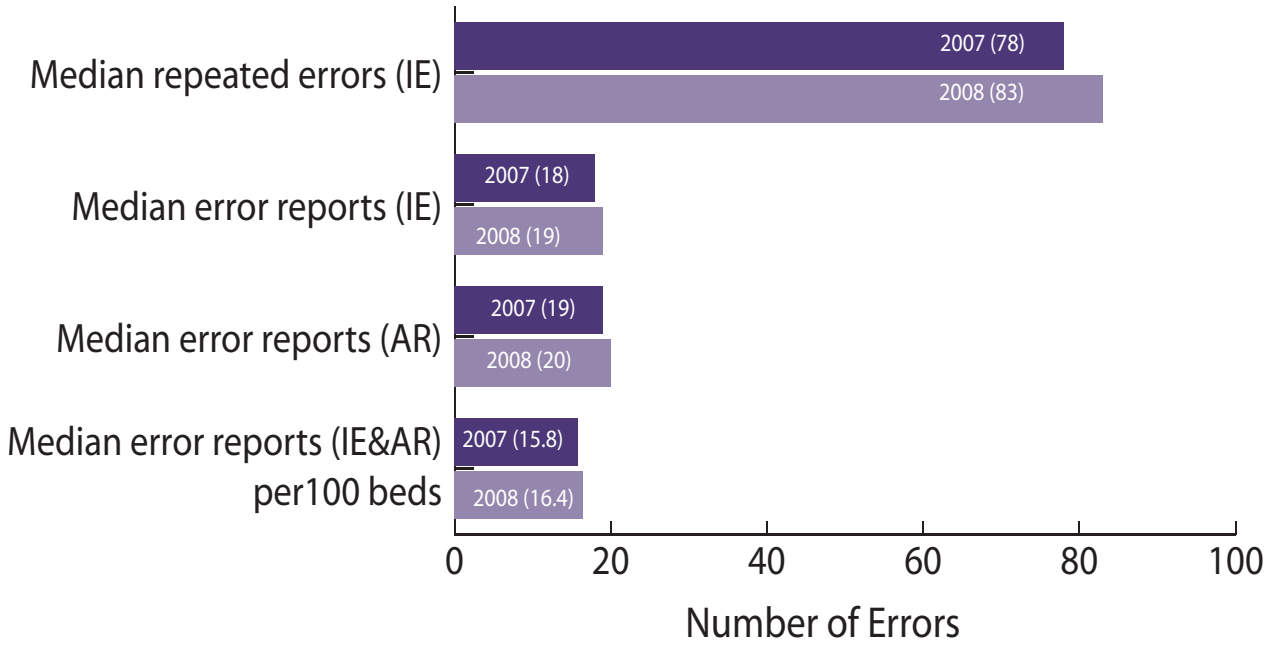
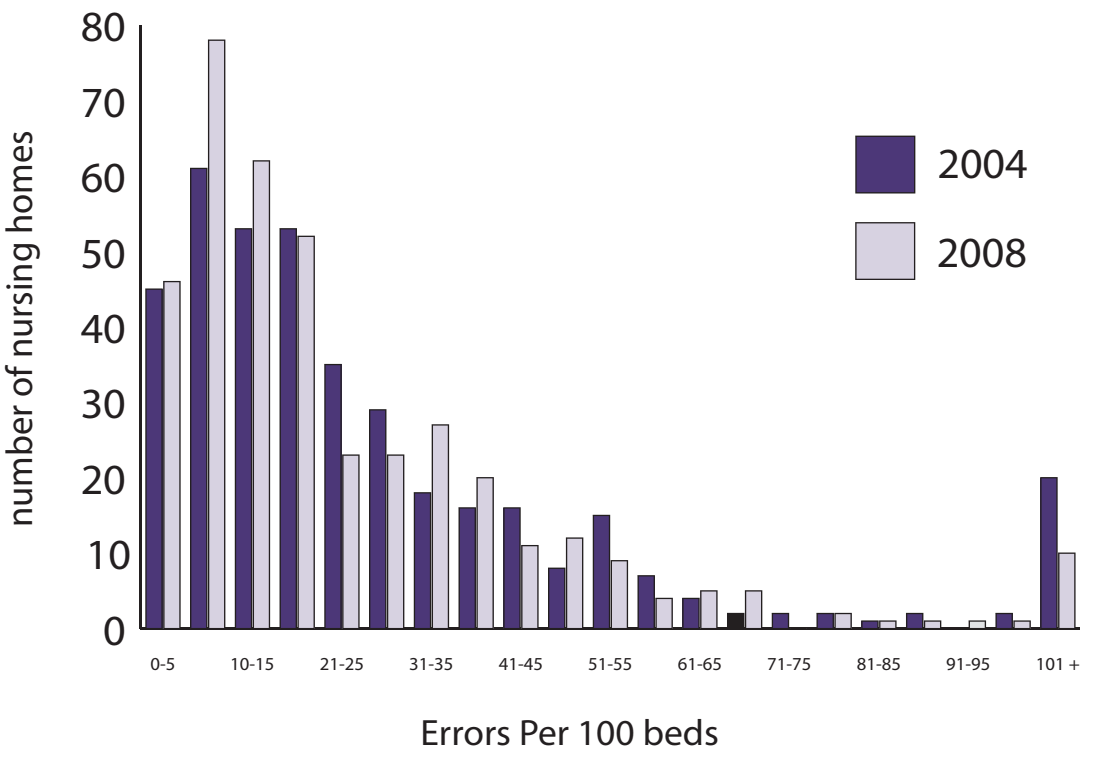


Figure 5. Errors per hundred beds. 2004 and 2008



Senate Bill 1016 Reviewed

Five years have passed since the implementation of medication error reporting in North Carolina was mandated by Senate Bill 1016. Below is a review of the major sections of the bill—including the medication error reporting requirement. We recommend that each nursing home review this list of bill highlights with their medication management advisory committee to ensure that progress has been made in all five sections (a complete copy of the bill can be found at www.shepscenter.unc.edu/meqi_info/).

- 131E-128.1. Nursing Home **Medication Management Advisory Committee.** Every nursing home shall establish a medication management advisory committee to advise the quality assurance committee on quality of care issues related to pharmaceutical and medication management and use in the nursing home. The advisory committee shall meet as needed but not less frequently than quarterly. Duties of the committee: assess the nursing home's pharmaceutical management system, review home's pharmaceutical management goals, review, investigate and respond to to nursing home incident reports, identify goals and recommendations to improve patient safety, develop non-punitive reporting system, develop specifications for drug dispensing and administration documentation procedures and develop specifications for self-administration of drugs by qualified patients.

- 131E-128.2. **Nursing Home Quality Assurance Committee; duties related to medication error prevention.** Every nursing home administrator shall ensure that the nursing home quality assurance committee develops and implements measures to minimize the risk of actual and potential medication-related errors. Measures need to: increase awareness and education of the patient and family member about all medications, increase prescription legibility, minimize confusion in drug labeling and packaging, developing non-punitive reporting process, implement proven medication safety practices, educate facility staff about similar sounding drug names, implement a system to accurately identify patients before a drug is administered, implement policies and procedures to improve accuracy in medication administration, implement policies and procedures for patient self-administration, investigate and analyze frequency and root cause of errors, and develop recommendations for plans to correct identified deficiencies in the home's pharmaceutical management practices.

- 131E-128.3. **Staff Orientation on Medication Error Prevention**. The nursing home administrator shall ensure that the nursing home provide a minimum of one hour of education and training in the prevention of actual and potential medication-related errors. Training shall be provided upon orientation and annually thereafter to all non-physician personnel involved in direct patient care. Training shall include: general information relevant to the administration of medications, instruction on categories of medication pertaining to the specific need of the patient receiving medication, the facilities policy and procedures regarding medication administration, how to assist patients with self-administration of medication where appropriate, and identifying and reporting actual and potential medication related errors.

- 131E-128.4. **Nursing Home Pharmacy Reports; duties of the consultant pharmacist**. The consultant pharmacist shall: conduct a monthly (at least) drug regimen review for actual and potential drug therapy problems for the entire nursing home and make preventive clinical recommendations for every patient receiving medication, report and document any drug irregularities and clinical recommendations to the nurse in charge and the administrator, report drug product defects and adverse drug reactions with the ASHSP-USP-FDA drug product defect reporting system, ensure that all known allergies and adverse effects are documented in plain view in the medical record, ensure that drugs that are not specifically limited as to duration of use or number of doses, be controlled by automatic stop orders and that the physicians are notified prior to the last dose before drug is discontinued, and submit a summary of reports to the medication management advisory committee.
- 131E-128.5. **Medication-related error reports.** All licensed nursing homes are reporting medication errors to the Cecil G. Sheps Center for Health Services Research (Contractor to DHSR) using the MEQI reporting system. All nursing homes are currently in compliance with this section of the Senate Bill.

Reduction of Serious Errors

► **HIGH ALERT MEDICATIONS:** Continue to improve training on high-alert common medications that cause the most serious errors: **warfarin, insulin, oxycodone, potassium chloride, morphine, furosemide.**

► **WRONG PATIENT:** Take steps to reduce wrong patient errors.

- Make sure orders are written in the correct chart.
- Make sure orders are transcribed correctly into the correct chart/MAR.
- Check medications that come from the pharmacy to make sure they are for the correct patient.
- Have systems in place for making sure that residents can be correctly identified, even by new or temporary workers.

► **WRONG PRODUCT:** Take steps to reduce wrong product errors.

- Put systems in place for double checking medications prior to administration.

► **OVERDOSE:** Take steps to reduce overdose errors.

- Put systems in place for checking dosages.
- Make sure medication administration is recorded, so that a second dose is not given inadvertently.

► **EVENING SHIFTS HAVE MORE SERIOUS ERRORS**

- The 3-11 pm (evening) shift appears more likely to have serious errors.
- If errors are occurring during this shift at your facility, take extra steps to ensure adequate training and provide additional support for that shift.

Medication Error Quality Initiative
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