Medication Error Quality Initiative (MEQI)

October 1, 2010 to September 30, 2011

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FOR HEALTH SERVICES RESEARCH

MEQI

Medication Error Quality Initiative

Improving Medication Safety in North Carolina Nursing Homes

Medication Error Quality Initiative (MEQI)
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PROJECT WEBSITE:
http://www.shepscenter.unc.edu/meqi

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Notes on Tables and Graphs

- *Patient Characteristics Table - errors in category one (circumstances) do not include patient information as no patient was involved.*
- *See the Patient Outcome section in the narrative for a definition of Minor and Serious Outcomes. Some national studies choose not to use patient outcome 4 as a serious error. These errors have been intentionally included in MEQI Serious Errors because any error with an effect that requires monitoring and/or intervention to preclude harm should be regarded as a serious error.*
- *Serious Outcomes are highlighted in red within the chart if they are over 16% of errors within that category. This is about double the average number of serious errors (7.8%).*

MEQI FY2011 Highlights

The MEQI Project

The Medication Error Quality Initiative, or MEQI, is a North Carolina nursing home medication error reporting system, as required by the 2003 NC Senate Bill 1016. All state licensed nursing homes have reported medication errors since January 2004, initially using an online annual summary system. Beginning in 2006, nursing homes transitioned to an improved online system where errors are entered individually as they occur throughout the year. Since 2009 all nursing homes have used the new system. 398 nursing homes are currently participating in reporting.

Recommendations for Nursing Homes - 2012

1. Print and use the data summary and graphic reports available from the MEQI System. Take these reports to medication management advisory and quality improvement meetings and share them with administration and pharmacy staff. Study the data, discuss errors with staff, and make patient safety an organizational goal. Only about one quarter of nursing homes are currently taking advantage of this free service.

Number of Nursing Homes who have used the graphic reports in 2011 by quarter:	
2011 quarter 1	32
2011 quarter 2	44
2011 quarter 3	67
2011 quarter 4	95

2. Open and review the materials in the MEQI Toolkit. A link will be found on the main menu page of the MEQI system upon log in. The toolkit is designed to provide information on the MEQI system and to lead nursing home staff through a process of brainstorming about what might contribute to errors and then assist in development of interventions to address those areas. A group discussion might lead the nursing home to make system changes in how medications are handled or administered, or lead a nursing home to focus their educational efforts on a specific shift.

Number of Nursing Homes using the MEQI toolkit in 2011 by quarter:	
2011 quarter 1	5
2011 quarter 2	34
2011 quarter 3	22
2011 quarter 4	17

3. Review errors at your nursing home that have serious patient outcomes. Plan targeted staff education, or make system changes, to deal with common serious events. The incident reports and graphic reports are just a starting place – the real work begins when a team identifies and addresses the issues that are leading to error. This will only happen if errors are entered on a regular basis so that reports can be reviewed over time.

- Percentage of Nursing Homes who enter errors throughout the year: 68% - For 2011 annual reporting, 270 nursing homes reported at least some errors throughout the year.
- Percentage of Nursing Homes who only enter errors during year-end reporting months: 32% - For 2011 reporting, 128 nursing homes entered errors only during September and October, which are the end of year reporting months.

4. Continue to review the medications on the error summary reports to identify which medications are most often involved in errors in your facility. In some cases additional training on these medications might be needed. In other cases it might be necessary to work with the consultant pharmacist on issues related to medication labeling, product confusion, or medication administration record (MAR) completion.

5. Be aware that residents who are transitioning from a hospital, other facility or home to the nursing home are at high risk for error. If you do not have a transition plan or medication reconciliation process in place, work with your medication management advisory committee to identify tools and processes that can be used during transitions to make sure residents get all needed medication.

Highlights

Patient Transitions and Medication Error

Patients transitioning to a nursing home from their home or other facility are at high risk for medication errors. MEQI staff studied 27,759 individual medication error incidents reported by North Carolina nursing homes during fiscal years 2007 through 2009 and found 2919 incidents (11%) that involved a patient transitioning to a nursing home. Errors involved in transitions were found to have a higher chance of patient harm compared with errors not involved in transitions. Staff communication, order transcription, medication availability, pharmacy issues, and name confusion were particularly important contributors to medication errors during transitions. Transitions across care settings introduce risk for patient harm, and medication errors are an important area for improvement during transitions.

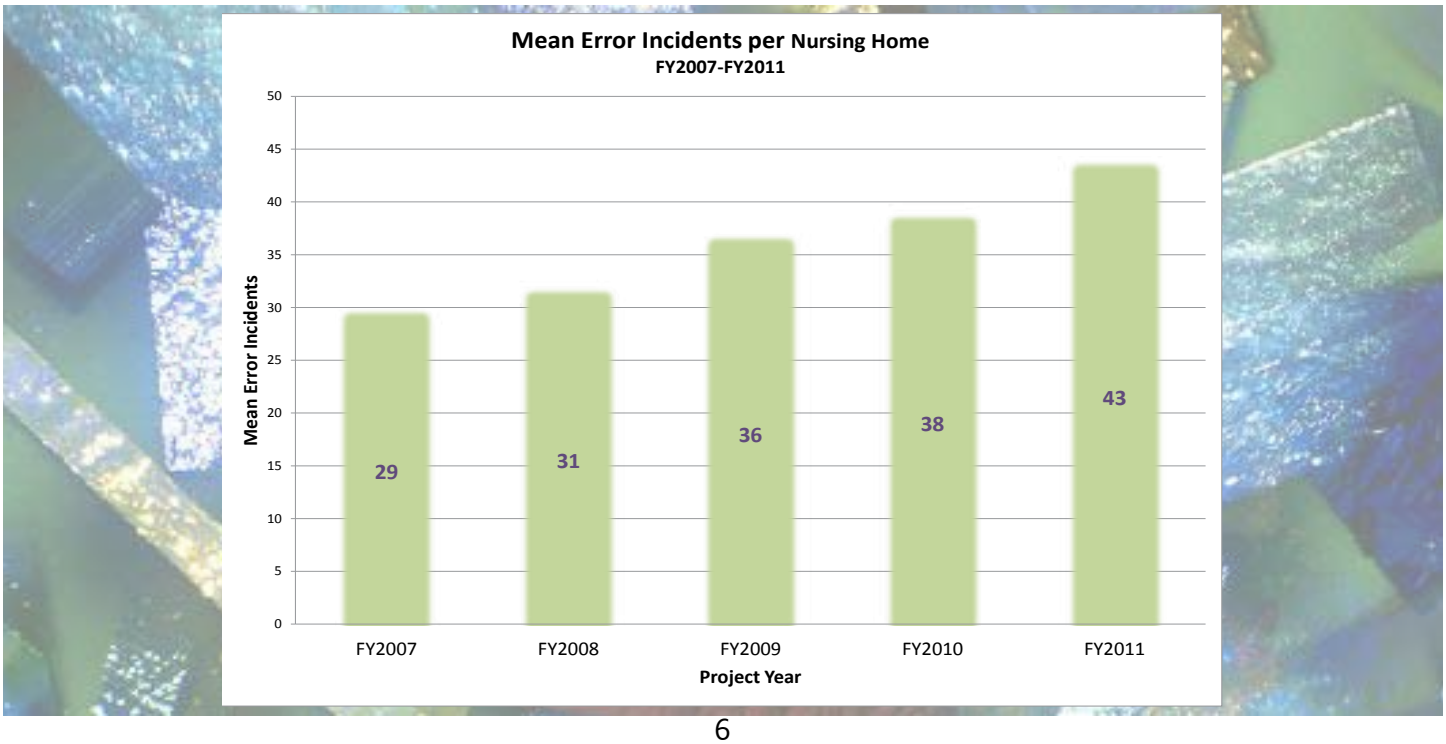
Desai, R., Williams, C.E., Greene S.B., Pierson S. and Hansen R.A. "Medication Errors during Patient Transitions into Nursing Homes: Characteristics and Association with Patient Harm", The American Journal of Geriatric Pharmacology. December 2011 Vol 9, Number 6 pages 413-422.

Anti - Coagulation Research

MEQI staff is also in the process of conducting an analysis of the errors involving anticoagulant medications over a two year period. Anticoagulant medications include warfarin, enoxaparin and heparin. This research hopes to show the relationship between this type of medication and patient harm, and identify what type of interventions in nursing homes would be most useful for preventing anticoagulant errors. Of 32,176 medication error incidents reported over a 2-year period, 1,623 (5%) were anticoagulant medication errors and 2% of these errors (n=29) resulted in patient harm. Anticoagulant medication errors had higher odds of patient harm when compared with other errors (OR=1.79, 95% CI: 1.20-2.66), and anticoagulant errors were significantly more likely than other drug errors to be caused by transcription error, communication problems, inadequate information, and shift change ($p<0.05$ for all).

2011 Reporting Highlights

- Number of Nursing Homes reporting: 398 - 100% of licensed nursing homes
- Mean number of reported error incidents is increasing over time
- Reported Incidents per 100 beds are increasing over time
- Median number of reported error incidents is remaining the same
- Percentage of reported errors that are serious is going down
- Percentage of reported errors that are repeated is going down. However, number of repeats in each repeat error incident is going up slightly
- Reported errors in transition from hospital are less serious than before, but errors reported during transitions from home are becoming more serious.
- Insulin and warfarin remain the most common medications involved in error, and also the most common in serious error. In addition, they are the errors most often repeated. All nursing homes should consider focused training programs to work on reducing errors with these two common high alert medications.



FY 2011 Data Summary

This report provides data reported during fiscal year 2011 (October 1, 2010 to September 30, 2011). For FY 2011, 100% of open and functional nursing homes submitted error incidents and also completed a year-end form to verify that submission was complete. Although it is mandatory to report all errors and potential errors, the completeness of reporting varies. The number of errors reported by individual facilities in FY 2011 ranges from 0 to 2257, a range which is not correlated with the size of the facility.

In the year-end summary form sites were asked to report if they had any medication- related liability claims against their facility during the year. None of the nursing homes reported a medication-related liability claim in FY 2011.

A total of 16,974 error incidents were reported in FY 2011 by 398 nursing homes. The mean number of error incidents per nursing home was 43, with an average of 35 errors per 100 beds. The median number of errors was 21 per facility. This is an increase of 1,772 reported errors from the FY2010 report (12 % increase), with only one additional new nursing home. This indicates an increase in reported errors, however not necessarily an increase in error occurrence.

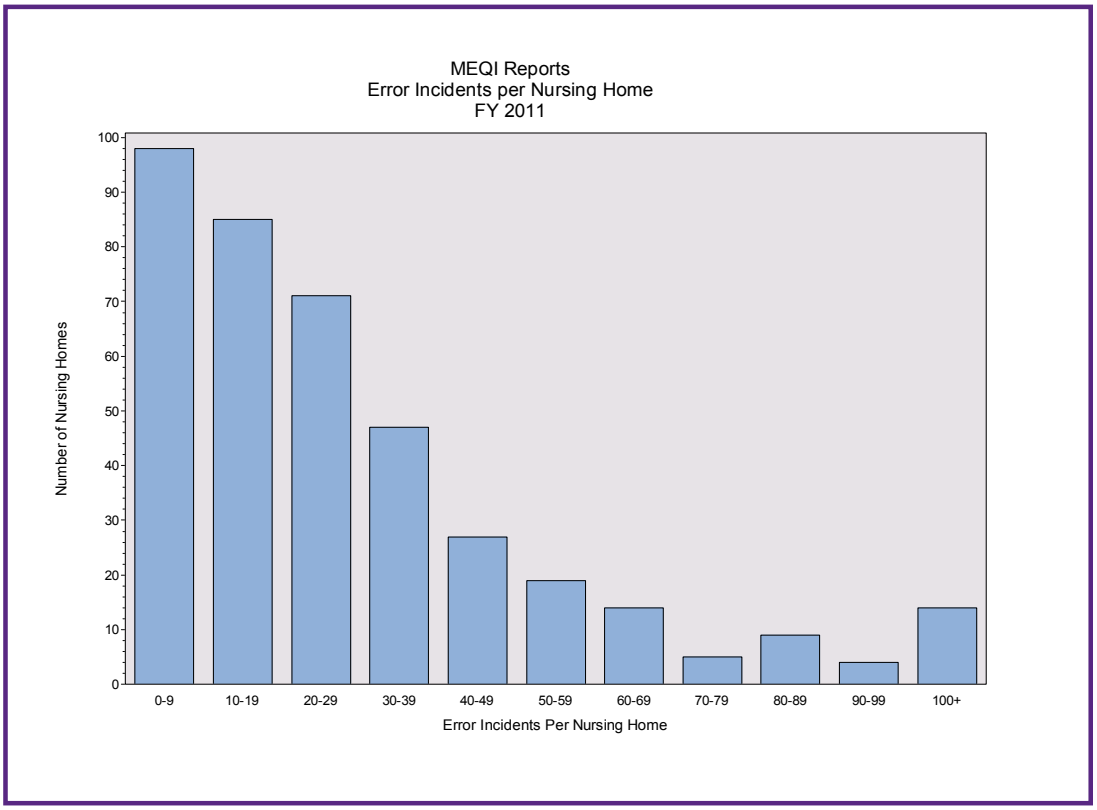
Of the 16,974 errors, 5,270 (31%) were repeated at least once and, for this year's data, there was an average of 12.9 repeats before the error was discovered. The overall number of repeated errors decreased this year by 4%, though there was a slight increase in the average number of repeats per incident. There were a total of 67,941 total repeat occurrences of errors including the original error, which is an average of 170 repeat errors per nursing home. An example of a repeated error would be a situation where a physician orders that a drug be discontinued, but this discontinuation does not get recorded in the Medication Administration Record (MAR), resulting in the drug being administered to the resident for five additional days. This would be reported by a nursing home as one error incident, but the form would indicate that there were five repeat occurrences of the error.

The data summary table shows results for the last three years, FY 2009 – FY 2011.

MEQI Reports
Summary Data
FY 2011

	Fiscal Year		
	2011	2010	2009
Number of nursing homes	398	397	395
Total number of error incidents	16,974	15,202	14,395
Number of error incidents with 1+ repeats	5,270	5,456	5,064
Total errors including repeats	67,941	66,256	59,558
Mean error incidents	43	38	36
Median error incidents	21	20	22
Incidents per 100 beds	35	32	31

A graph is also provided that shows the numbers of error incidents per nursing homes. This graph shows that about 46% of the nursing homes reported between 0 and 19 errors in FY 2011. Another 31% of homes reported between 20 and 39 errors, and the last 23% reported more than 40 errors. Overall more nursing homes this year have increased their error reporting. This does not necessarily mean that more errors are occurring. It may indicate a greater awareness of medication errors and a culture that permits reporting of errors. Accounting for nursing home bed size has very little impact on these results. Though some variation of errors might be accounted for by the quality of the nursing home, this large variation in errors suggests that all nursing homes may not use the same standards for what kinds of errors are reported. MEQI will continue to provide information in our regular emails and mailings, on the informational website and through our reporting system to educate nursing homes and new staff about reporting requirements and encourage more consistent reporting of all medication errors and potential errors.



The National Coordinating Council for Medication Error Reporting (NCC MERP) states that "The use of medication error rates to compare health care organizations is of no value. The goal of every health care organization should be to continually improve systems to prevent harm to patients due to medication errors." MEQI supports every nursing home in the consistent collection of data, and provision of reports. This however is only part of the process in reducing medication errors. It is important that all NC nursing home actively review and address these errors within their medication management or quality meetings, and work closely with their pharmacy consultant to improve systems.

NCC MERP additionally states that "The value of medication error reports, and other data gathering strategies, is to provide the information that allows an organization to identify weaknesses in its medication use system and to apply lessons learned to improve the system. The sheer number of error reports is less important than the quality of the information collected in the reports, the health care organization's analysis of the information, and its actions to improve the system to prevent harm to patients." *(Statement from NCC MERP: Use of Medication Error Rates to Compare Health Care Organizations is of No Value, adopted June 11, 2002, reviewed June 24, 2008.)*

Case Study from a NC Nursing Home

What happened (basic description of error)?

Dialysis ordered two medications for resident. The order was just a note on the progress note. A copy of the order form was sent to dialysis for confirmation, but it was never returned.

What medication(s) was involved?

Diovan [blood pressure/heart medication] and flora-Q [dietary supplement]

What type of personnel was involved?

PA [Physician Assistant] at dialysis and LPN [Licensed Practical Nurse] on staff

What was the outcome of the error?

Resident did not get meds for 2 days

What were the changes you made so this error did not happen again?

Any order from dialysis will be called in to the medical director as soon as it is received. Meds will be ordered and given as ordered. A telephone confirmation from dialysis will be considered adequate as long as it is supported by the medical director.

What personnel were involved in making sure this got fixed?

DON [Director of Nursing], QI Nurse [Quality Improvement Nurse], SDC [Staff Development and Infection Control Nurse], Medical Director and Administrator

How long did it take to get these changes made?

It was corrected as soon as it was discovered (2 days).

Were there any obstacles to getting these changes made?

No.

Note: This case study was submitted voluntarily by a participating nursing home.

We welcome additional submissions at meqi@shepscenter.unc.edu

Patient Outcomes: Definition of Minor/Serious	
MINOR ERROR OUTCOMES	1 Capacity to cause error; no patient involved
	2 Error occurred; but did not reach the patient
	3 Error occurred and reached the patient, but did not cause harm (dose omission with no effecte should be included here)
SERIOUS ERROR OUTCOMES	4 Error occurred and reached the patient and required monitoring and/or intervention to preclude harm
	5 Error occurred and reached the patient and resulted in temporary patient harm
	6 Error occurred and reached the patient and resulted in temporary harm, requiring a trip to Emergency Department
	7 Error Occurred and reached the patient and contribued to permanent patient harm
	8 Error occurred and reached the pateint and resulted in intervention necessary to sustain life
	9 Error occurred and reached the patient and contributed to the patient's death

Patient Outcomes

All errors are categorized by those who submit the error into one of nine patient outcomes. The nine outcomes have then been further categorized by MEQI into a minor or serious outcome category. The minor errors are those where no patient was involved, the error does not reach the patient, or where the error reached the patient but there was no harm or effects (i.e. dose omission with no physical effects). Those errors placed in the serious category are those where ongoing monitoring or intervention were needed, or an error where the patient was harmed temporarily or permanently.

For FY 2011, 92.2% of errors were in the minor outcome categories and 7.8% were in the serious outcome categories. This is 2% less serious errors than in FY2010. Of the 92.2% minor errors, 21.6 % were either a situation where there was a capacity for error, or the error was stopped before it reached the patient, an increase of 5.9% from FY2010. This accounts for most of the increase in minor errors, as only 70.6 % were errors that reached the patient, but caused no harm. Of the 7.8% serious outcome errors, nearly all were errors that required monitoring and/or intervention to preclude harm (9.1% of total). Only 158 errors (less than 1%) were errors which lead to temporary or permanent patient harm, with only two errors incidents leading to the death of a patient.

MEQI REPORTS
Patient Outcomes
FY 2011

	Error N	% of N	Repeat N	Repeat % of N
All Errors	16,974	100.0	67,941	100.0
Patient Outcome				
1=Capacity to cause error	523	3.1	1,493	2.2
2=Did not reach patient	3,139	18.5	5,566	8.2
3=Reached the patient but did not cause any harm	11,981	70.6	53,791	79.2
4=Required monitoring/intervention to precule harm	1,173	6.9	6,175	9.1
5=Temporary harm to patient	125	0.7	759	1.1
6=Temporary harm with trip to ER	29	0.2	122	0.2
7=Permanent patient harm	2	0.0	33	0.0
8=Intervention necessary to sustain life	0	0.0	0	0
9=Patient death	2	0.0	2	0.0

MEQI REPORTS
Patient Characteristics
FY 2011

	Error N	% of N	Repeat N	Repeat % of N	Minor Outcome %	Serious Outcome %
All Errors	16,974	100.0	67,941	100.0	92.2	7.8
Age Group						
64 yrs or younger	2,565	15.1	8,976	13.2	93.5	6.5
65-74 years	3,561	21.0	13,025	19.2	92.4	7.6
75-84 years	4,824	28.4	21,849	32.2	91.2	8.8
85 years or older	5,501	32.4	22,598	33.3	91.5	8.5
na	523	3.1	1,493	2.2	100.0	0
Gender						
Female	11,175	65.8	45,634	67.2	91.8	8.2
Male	5,276	31.1	20,814	30.6	92.2	7.8
na	523	3.1	1,493	2.2	100.0	0
Cognitive Ability						
Patient able to direct own care	4,124	24.3	18,457	27.2	89.4	10.6
Patient unable to direct own care	11,824	69.7	45,912	67.6	92.9	7.1
Unknown	503	3.0	2,079	3.1	88.5	11.5
na	523	3.1	1,493	2.2	100.0	0
Number of Medications Daily						
01 - 05 meds	201	1.2	924	1.4	89.6	10.4
06 - 10 meds	1,449	8.5	6,968	10.3	90.5	9.5
11 - 15 meds	1,909	11.2	9,211	13.6	91.0	9.0
16 - 20 meds	825	4.9	3,936	5.8	90.4	9.6
20 or more meds	439	2.6	2,006	3.0	90.0	10.0
Not reported	12,151	71.6	44,896	66.1	92.8	7.2
Patient Transition						
From Home	71	0.4	313	0.5	77.5	**22.5**
From Hospital	1,805	10.6	10,182	15.0	86.9	13.1
From Other facility	79	0.5	506	0.7	87.3	12.7
Not Transitioning	15,019	88.5	56,940	83.8	92.9	7.1
Bed Type						
Adult Care Bed	543	3.2	3,149	4.6	90.6	9.4
Skilled Nursing	15,181	89.4	60,053	88.4	92.0	8.0
na	1,250	7.4	4,739	7.0	94.7	5.3

Patient Characteristics

Errors by Age Group and Gender

By age group, 15.1% of NC nursing home patients affected by medication errors are under 65 (2,565 errors), 21% between ages 65-74 (3,561 errors), 28.4% between the ages of 75-84 (4,824), and 32.4% 85 years or older (5,501). The age of patient does not appear to be related to the seriousness of the error. However, based on the national nursing home survey from 2004, it would be expected that about 12% of residents are younger than 65 years of age, 12% between 65-74, 32% between 75-84 and 45% over 85. It would appear that errors are proportionally more likely to affect the younger nursing home population (under 74) more often than the over 85 population; however this does not take into account the number of medications and doses in each age group. Further research is needed in this area.

Regarding gender, 65.8 % were female and 31.1% were male, which is similar to the gender distribution of the national nursing home population of 71.2% female and 28.8% male (National Nursing Home Study 2004).

Resident's Ability to Direct Their Own Care

Nursing home staff members who record errors are asked to identify whether the patient is able or unable to direct their own care. 69.7 % of errors involve residents identified as able to direct their own care, and 24.3% are unable to direct their own care. The percentage of errors in those unable to direct their own care is decreasing.

Errors during Transitions of Care

Whether the error occurred while the patient was transitioning into the nursing home from their home, hospital or another facility was also recorded, and such a transition is noted in about 1 out of 10 errors (11.5% of all error incidents). A total of 1,955 errors occurred in transition, 71 from home (0.4%), and 1,805 from hospital (10.6%) and 79 from another facility (0.5%). In general, errors in transition are slightly more likely to end with more serious patient outcomes. In past years, transitions from hospitals and other facilities seem to be those most prone to serious error, and this has been emphasized as an area of concern to nursing homes. However this year there have been improvements in errors during transitions with only 13.1% of transitions from hospitals and 12.7% of transitions from other facilities ending in serious error. For FY2011 we have instead seen an increase in the number of serious errors from home transitions, with 22.5% of home transitions ending in serious error. This is more than doubling the percentage of serious errors in this category since FY2010.

Bed Type

Many nursing homes in NC also maintain adult care (assisted living) units or floors within their facility, in addition to skilled nursing. Though the need to record errors for this group is noted in the legislation ('Nursing home' means a nursing home licensed under this Chapter and includes an adult care home operated as part of a nursing home. Senate Bill 1016), prior to 2010 we did not track which errors were from adult care beds compared to skilled nursing beds. In 2010 nursing homes started recording whether the error occurred within a skilled nursing bed or adult care bed. In 2011, 89.4% of errors were reported as skilled nursing, 3.2% in adult care, and 7.4% as unknown/not applicable.

MEQI REPORTS Type of Error FY 2011	Error N	% of N	Repeat N	Repeat % of N	Minor Outcome %	Serious Outcome %
All Errors	16,974	100.0	67,941	100.0	92.2	7.8
Type of Error						
Dose omission	6,902	40.7	24,885	36.6	93.4	6.6
Wrong documentation	4,362	25.7	16,663	24.5	96.0	4.0
Overdose	1,122	6.6	6,171	9.1	85.7	14.3
Wrong strength	900	5.3	4,081	6.0	89.1	10.9
Wrong product	643	3.8	2,157	3.2	88.2	11.8
Monitoring error	518	3.1	1,167	1.7	90.9	9.1
Wrong time	495	2.9	1,674	2.5	91.1	8.9
Wrong patient	459	2.7	727	1.1	76.9	**23.1**
Underdose	430	2.5	2,937	4.3	88.6	11.4
Expired order	322	1.9	3,065	4.5	92.2	7.8
Wrong duration	307	1.8	3,138	4.6	90.6	9.4
Labwork error	251	1.5	320	0.5	92.0	8.0
Wrong form	70	0.4	405	0.6	90.0	10.0
Product allergy	62	0.4	115	0.2	69.4	**30.6**
Wrong technique	59	0.3	91	0.1	86.4	13.6
Wrong rate of administration	35	0.2	142	0.2	85.7	14.3
Wrong route	29	0.2	157	0.2	89.7	10.3
Expired product	8	0.0	46	0.1	100.0	0

Types of Error

The two most common types of errors in 2011 remain dose omission and wrong documentation. Forty-one percent (6,902) are dose omission errors, and 26 percent are wrong documentation errors. Other commonly reported types of errors are overdose/multiple dose at 6.6%, wrong strength at 5.3%, wrong product at 3.8%, monitoring error at 3.1%, wrong time at 2.9% and wrong patient at 2.7%. There are only two types of errors in FY 2010 that are more than twice as likely to have serious outcomes as all of the errors (average 7.8% serious), wrong patient 23.1% serious and product allergy 30.6% serious (note: product allergy has a small number of total errors). Two areas in which we saw improvement this year were in wrong route (reduced from 33.3% to 10% serious) and lab-work errors (reduced from 24.2% to 8% serious). Though both of these are a small percentage of total errors, the nature of these types of error can often lead to serious outcomes.

MEQI REPORTS
Medications Involved in Error
FY 2011

	Error N	% of N	Repeat N	Repeat % of N	Minor Outcome %	Serious Outcome %
All Errors	16,974	100.0	67,941	100.0	92.2	7.8
Medications						
Insulin	765	4.5	3,242	4.8	82.5	**17.5**
Warfarin	700	4.1	1,713	2.5	74.6	**25.4**
Hydrocodone	546	3.2	1,639	2.4	94.9	5.1
Lorazepam	507	3.0	1,185	1.7	93.3	6.7
Oxycodone	477	2.8	1,160	1.7	89.5	10.5
Furosemide	317	1.9	1,498	2.2	84.9	15.1
Fentanyl	309	1.8	359	0.5	82.2	**17.8**
Omeprazole	285	1.7	1,201	1.8	98.2	1.8
blood stick test (no drug listed)	253	1.5	332	0.5	99.6	0.4
Levothyroxine	252	1.5	1,069	1.6	91.7	8.3
Clonazepam	236	1.4	534	0.8	96.2	3.8
Alprazolam	226	1.3	587	0.9	93.8	6.2
Metoprolol	224	1.3	1,325	2.0	90.6	9.4
Potassium chloride	221	1.3	1,127	1.7	90.5	9.5
Acetaminophen	213	1.3	771	1.1	98.6	1.4
Simvastatin	204	1.2	682	1.0	97.5	2.5
Docusate	201	1.2	922	1.4	98.5	1.5
Gabapentin	200	1.2	408	0.6	98.0	2.0
Aspirin	187	1.1	1,148	1.7	97.3	2.7
Zolpidem	187	1.1	692	1.0	87.2	12.8
other lab test (no drug listed)	186	1.1	270	0.4	97.8	2.2
Polyethylene glycol	169	1.0	879	1.3	96.4	3.6
Tramadol	159	0.9	283	0.4	95.6	4.4
Trazodone	159	0.9	577	0.8	96.2	3.8
Calcium-vitamin D	155	0.9	499	0.7	98.7	1.3
Ocular lubricant	155	0.9	762	1.1	98.7	1.3
Quetiapine	151	0.9	641	0.9	96.0	4.0
Mirtazapine	142	0.8	864	1.3	95.1	4.9
Albuterol-ipratropium	133	0.8	662	1.0	97.7	2.3
Calcium carbonate	132	0.8	560	0.8	100.0	0
Morphine	124	0.7	230	0.3	86.3	13.7
Cyanocobalamin	120	0.7	358	0.5	95.8	4.2
Other drug	8,679	51.1	39,762	58.5	93.1	6.9

Medications Involved in Error

There were 660 different medications reported in errors for FY2011. 476 of these were reported in more than one error, and 306 in more than 5 errors. The most common medications involved in errors—the medication actually given to the patient, or not given in case of dose omission—continue to be similar to those in prior years. Insulin (765) is the most common medication involved in errors, followed by warfarin (700), hydrocodone combinations (546), lorazepam (507), and oxycodone combinations (477). Insulin errors would be even higher if we included errors that reported no medication, but indicated the error was related to a "blood stick test". Warfarin errors are also underestimated, as additional errors made with INRs are sometimes reported as an error in "other lab tests", without a listed medication. Many of these common medications in NC nursing home error are also consistently included on lists of dangerous medications and on lists of medications that are cautioned for use in the elderly. Aside from warfarin and insulin, the other most common medications (and those causing the most serious errors) are controlled substances. The Medications Table includes the 32 most common types of medications involved in error incidents in NC. These 32 medications each have over 100 errors and together account for one half (49 %) of all error incidents. Within this list there are three medications that are more than twice as likely to have serious outcomes (average is 7.8 % serious): warfarin (25.4% serious), fentanyl (17.8% serious) and insulin (17.5% serious). Of these three, warfarin and insulin have fewer serious errors since the previous year, and fentanyl has an increased number of serious errors.

MEQI REPORTS
Medications Involved in Error byTherapeutic Class Name
FY 2011

	Error N	% of N	Minor Outcome %	Serious Outcome %
All Errors	16,974	100.0	92.2	7.8
Therapeutic Class				
Central nervous system agents	4,725	27.8	92.3	7.7
Cardiovascular agents	1,647	9.7	89.4	10.6
Metabolic agents	1,508	8.9	88.9	11.1
Nutritional products	1,437	8.5	96.0	4.0
Gastrointestinal agents	1,413	8.3	97.4	2.6
Psychotherapeutic agents	1,114	6.6	93.6	6.4
Anti-infectives	1,111	6.5	90.9	9.1
Coagulation modifiers	1,088	6.4	80.5	**19.5**
Topical agents	824	4.9	94.7	5.3
Miscellaneous agents	683	4.0	96.2	3.8
Respiratory agents	638	3.8	96.7	3.3
Hormones/hormone modifiers	424	2.5	93.2	6.8
Biologicals	117	0.7	81.2	**18.8**
Genitourinary tract agents	97	0.6	97.9	2.1
Antineoplastics	60	0.4	95.0	5.0
Alternative medicines	52	0.3	100.0	0
Immunologic agents	36	0.2	94.4	5.6

Therapeutic Class

Medications involved in error have been grouped by therapeutic class based on the American Hospital Formulary Service® (AHFS) system. The medications are grouped into seventeen different classes. Twenty-nine percent of the errors (4,725) are with medications that are classified as central nervous system agents. Central nervous system agents include narcotics, analgesics, anticonvulsants and sedatives. Other therapeutic classes with over 1000 errors each are cardiovascularagents,metabolicagents (includes the various insulin products), nutritional products, gastrointestinal agents, psychotherapeutic agents, anti-infectives, and coagulation modifiers. Coagulation modifiers (anticoagulants), which include warfarin, enoxaparin, and heparin, is the class with the most serious outcomes – with 19.5% of errors (212 of 1088 errors errors) in this class leading to an error with an outcome category 4-9. Biologicals is the only other class with a high percentage of serious outcomes (18.8%), but this class only has very few errors as this class of drugs is used rarely.

Effects of Errors on Patients

In this section, nursing homes are asked to report the effect of the error on the patient and more than one effect can be noted. As in prior years most errors were reported as having no injury or effect. For FY 2011, 15,968 or 93.6% of reported errors had no injury or physical effect. Only 1006 of the errors reported noted a physical effect of the error. The most common reported effect, with 389 errors (36 % of error effects), is inadequate effect of medication. This is primarily related to dose omission errors, where the resident did not receive their medication. Other effects that were commonly reported include: increase/decrease in PT/INR (125) which is a test used to look at the effect of anticoagulants (such as warfarin) and blood clotting, increase or decrease in blood sugar (115) often used in conjunction with insulin use, increase or decrease in blood pressure (68 errors), pain (66 errors), somnolence/lethargy (68 errors), and agitation/anxiety (53 errors).

MEQI REPORTS
Effects of Error on Patient
FY 2011

	Error N	% of N	Repeat N	Repeat % of N
All Errors	17,062	100.0	68,604	100.0
Effects				
No injury or effect	15,968	93.6	62,104	90.5
Inadequate effect	389	2.3	3,193	4.7
PT/INR increase/decrease	125	0.7	370	0.5
Change in blood sugar	115	0.7	509	0.7
Change in blood pressure	68	0.4	315	0.5
Somnolence/lethargy	68	0.4	244	0.4
Pain	66	0.4	212	0.3
Agitation/anxiety	53	0.3	238	0.3
Excessive side effects	40	0.2	348	0.5
Sleep change	32	0.2	109	0.2
Mood change	17	0.1	119	0.2
Cognitive change	17	0.1	211	0.3
Allergic reaction	15	0.1	23	0.0
Edema	14	0.1	95	0.1
Nausea/Vomiting	13	0.1	101	0.1
Constipation/Diarrhea	12	0.1	126	0.2
Fall	11	0.1	17	0.0
Seizure	11	0.1	56	0.1
Weight change	9	0.1	34	0.0
Respiratory distress	8	0.0	58	0.1
Appetite change	6	0.0	104	0.2
Headache	2	0.0	13	0.0
Wound/fracture/bruise	2	0.0	4	0.0
GI bleed	1	0.0	1	0.0

Cause of Errors

The most commonly reported cause of error this year was 'staff did not follow policies and procedures', with 56.4% of errors reporting this as a cause. Other common causes include transcription error (3,757 reports, 17.6%), distractions on floor (2,659 reports, 12.4%), poor communication (853 reports, 4.0%), and medication unavailable (444 errors, 2.1%). In 2011 there are five causes of errors that are more than twice as likely to have serious outcomes; however, some of these are indicated in only a small number of errors; use of abbreviations (17 errors, 23.5% serious), improper training (81 errors, 23.5% serious), shift change (107 errors, 21.5 % serious), illegible handwriting (72 errors, 19.4% serious), and name confusion (203 errors, 16.7% serious). Several causes that had many serious errors last year, such as exhaustion, emergency on the floor and poor communication have improved and have fewer serious errors this year.

MEQI REPORTS
Cause of Error
FY 2011

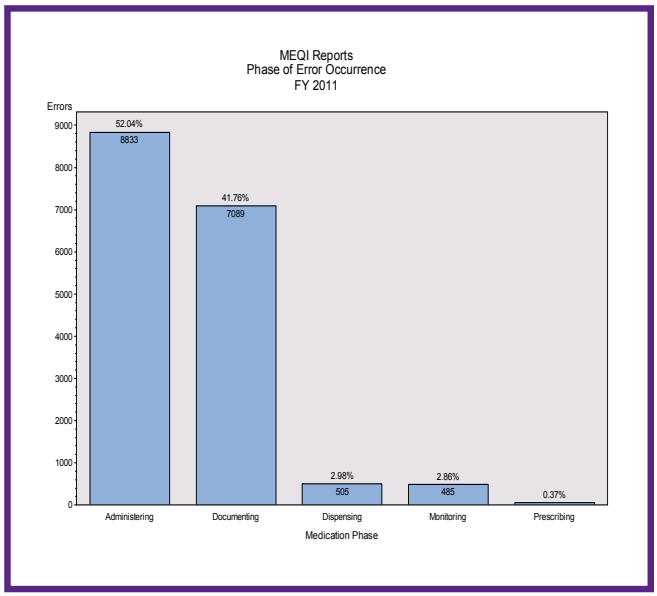
	Error N	% of N	Repeat N	Repeat % of N	Minor %	Serious %
All Errors	21,366	100.0	88,646	100.0	91.9	8.1
Primary Personnel						
Staff did not follow policies	12,053	56.4	39,523	44.6	93.0	7.0
Transcription error	3,757	17.6	31,573	35.6	88.6	11.4
Distractions on floor	2,659	12.4	5,526	6.2	96.2	3.8
Poor communication	853	4.0	3,194	3.6	88.6	11.4
Medication unavailable	444	2.1	1,795	2.0	91.7	8.3
Pharmacy dispensing	288	1.3	2,050	2.3	89.2	10.8
Current policies faulty	223	1.0	720	0.8	91.0	9.0
Name confusion	203	1.0	643	0.7	83.3	**16.7**
Inadequate info	122	0.6	852	1.0	86.1	13.9
Pharm delivered wrong med	114	0.5	743	0.8	88.6	11.4
Shift change	107	0.5	357	0.4	78.5	**21.5**
Package design	104	0.5	208	0.2	91.3	8.7
Improper training	81	0.4	149	0.2	76.5	**23.5**
Illegible handwriting	72	0.3	578	0.7	80.6	**19.4**
Exhaustion	69	0.3	150	0.2	87.0	13.0
Emergency on floor	64	0.3	72	0.1	89.1	10.9
Too much workload/overtime	54	0.3	204	0.2	85.2	14.8
Product label	54	0.3	165	0.2	90.7	9.3
Use of abbreviations	17	0.1	82	0.1	76.5	**23.5**
Poor working conditions	12	0.1	20	0.0	91.7	8.3
Pharmacy closed	8	0.0	24	0.0	87.5	12.5
Pharm delivered to wrong facility	8	0.0	18	0.0	100.0	0

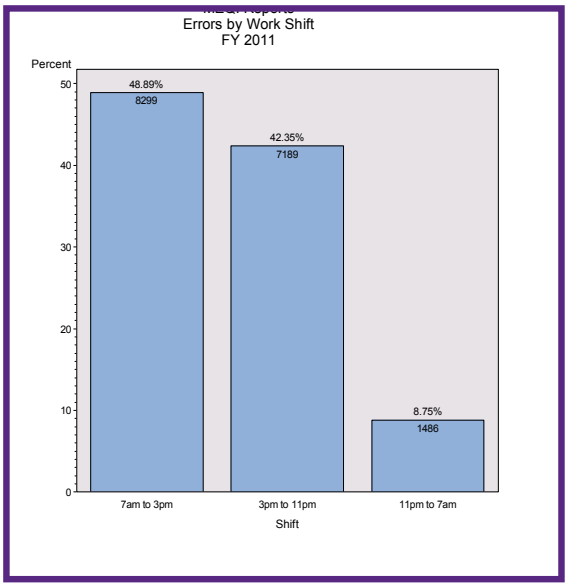
MEQI REPORTS
Phase of Error Occurence
FY 2011

	Error N	% of N	Repeat N	Repeat % of N	Minor %	Serious %
All Errors	16,974	100.0	67,941	100.0	92.2	7.8
Phase						
Administering	8,833	52.0	21,205	31.2	91.9	8.1
Documenting	7,089	41.8	43,175	63.5	92.8	7.2
Dispensing	505	3.0	2,203	3.2	92.3	7.7
Monitoring	485	2.9	989	1.5	88.5	11.5
Prescribing	62	0.4	369	0.5	79.0	**21.0**

Phase Where Errors Occur

Nursing homes also report in which of the five process phases the medication error initially occurred. Most errors reported are those that occur within the nursing home itself, with 52% in medication administration, 42% in the documentation phase and 3% during the monitoring phase. In 2011 only 0.4 % of the errors were reported in the prescribing phase (62 errors) and 3% in dispensing (505 errors). These two type of errors are usually only reported in our system if discovered or idenfied by nursing home staff. Although the prescribing errors that make it all the way through pharmacy checks to the floor of the nursing home tend to be more serious, prescribing errors account for only a small percentage of the total reported errors. There was a noticable decrease in dispensing errors reported this year, from 4.8% of total in 2010 to 3.0% in 2011. The largest percentage of repeat errors continues to be those related to documentation.





Work Shift

Each error is also attached to the work shift in which the error occurred, or if unknown, the shift where the error was identified. About half (48.9%) of all errors continue to be noted as day shift incidents (7am to 3pm). Another 42.4% were noted as the afternoon/evening shift incidents (3pm to 11pm). A smaller number of errors (8.8%) were noted as nightshift incidents (11pm to 7am). Since most medications are administered during the day and evening shifts, more errors would be anticipated during these shifts compared to the night shift. For FY 2011 there was little variation in serious outcomes among shifts.

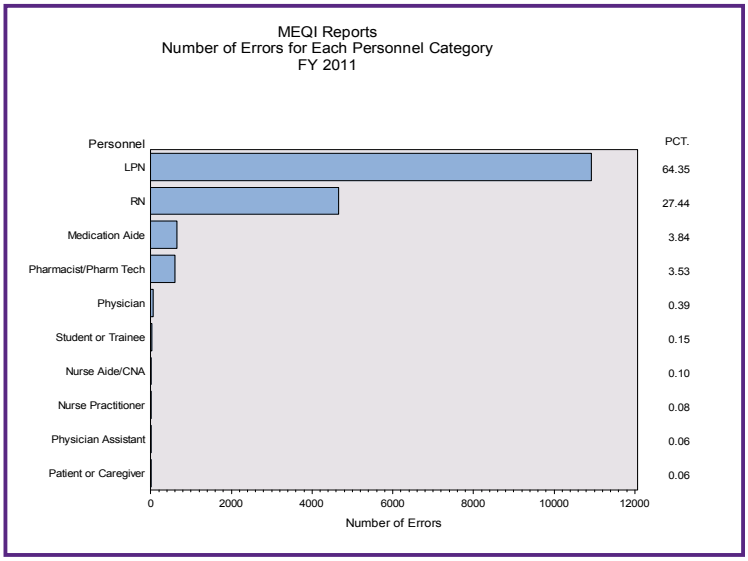
MEQI REPORTS
Work Shift of Error Occurrence
FY 2011

	Error N	% of N	Repeat N	Repeat % of N	Minor Outcome %	Serious Outcome %
All Errors	16,974	100.0	67,941	100.0	92.2	7.8
Work Shift						
7am to 3pm	8,299	48.9	41,629	61.3	91.8	8.2
3pm to 11pm	7,189	42.4	21,779	32.1	92.6	7.4
11pm to 7am	1,486	8.8	4,533	6.7	92.3	7.7

MEQI REPORTS Personnel FY 2011						
	Error N	% of N	Repeat N	Repeat % of N	Minor Outcome %	Serious Outcome %
All Errors	16,974	100.0	67,941	100.0	92.2	7.8
Primary Personnel						
LPN	10,922	64.3	45,157	66.5	92.4	7.6
RN	4,657	27.4	15,866	23.4	91.6	8.4
Medication aide	651	3.8	2,494	3.7	94.2	5.8
Pharmacist/pharm tech	600	3.5	3,625	5.3	92.2	7.8
Physician	67	0.4	487	0.7	86.6	13.4
Student or trainee	26	0.2	36	0.1	73.1	26.9
Nurse aide/CNA	17	0.1	85	0.1	82.4	17.6
Nurse practitioner	14	0.1	58	0.1	64.3	35.7
Physician assistant	10	0.1	123	0.2	80.0	20.0
Patient or caregiver	10	0.1	10	0.0	80.0	20.0
Physician assistant	5	0.0	32	0.0	100.0	0.0
Temp/contract						
No	16,513	97.3	65,726	96.7	92.2	7.8
Unknown	312	1.8	1,602	2.4	93.9	6.1
Yes	149	0.9	613	0.9	82.6	17.4

Personnel Involved in Error

Nurses, both RN and LPN, are primarily responsible for the delivery of medications in nursing homes. LPNs, who are the most common caregivers, are responsible for most medication error incidents (64.3%), while RNs are responsible for 27.4%. Pharmacists or pharmacy staff account for another 3.5% of errors (a reduction from 5.1% in 2010). Medication aides are responsible for 3.8 % of errors. In 149 errors (0.9%) the primary personnel involved in the error was listed as a temporary, contract, or agency staff. In 2011 there are about half as many errors involving temporary or contract workers as in 2010. These errors continue to be more serious than those of regular personnel, with 17.4% serious outcomes for temporary personnel compared to only 7.8% for regular personnel.



Conclusion

During the 2011 fiscal year the MEQI project has seen a continued increase in the submission of error reports, thought the number of serious errors has lessened. Overall there has been a notable reduction in reporting of dispensing and pharmacy related errors. Warfarin and insulin continue to be involved in large number of errors, many of those with serious outcomes. We have identified that only a limited number of nursing homes are taking advantage of the printable graphic reports, with only one quarter of nursing homes using these at the end of the reporting year. Fewer still have reviewed the materials in the toolkit. Error reporting alone will not reduce medication errors. Nursing homes are encouraged to use all available tools to continue discussions about preventing medication errors and improving patient safety with their medication management advisory committees, quality committees and their pharmacy consultants.

Technical assistance and support for all aspects of the project are available upon request from the project by emailing meqi@shepscenter.unc.edu

MEQI
Medication Error Quality Initiative
Improving Medication Safety in North Carolina Nursing Homes

PROJECT WEBSITE:
http://www.shepscenter.unc.edu/meqi