Medication Error Quality Initiative (MEQI)

October 1, 2011 to September 30, 2012

# ANNUAL REPORT
# 2012

UNC | THE CECIL G. SHEPS CENTER FOR HEALTH SERVICES RESEARCH

MEQI
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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

This report is produced by the Cecil G. Sheps Center for Health Services Research (Sheps Center) at the University of North Carolina at Chapel Hill for the North Carolina Department of Health and Human Services, Division of Health Service Regulation.

## Funded by:

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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 in some tables if they are double the average number of serious errors.

# MEQI FY2012

## The MEQI Project

The Medication Error Quality Initiative, or MEQI, is a North Carolina nursing home medication error reporting system, as required by NC Senate Bill 1016 (2003). 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 currently are participating in reporting. Due to a lack of funding, this will be the final year of the MEQI Project. The section of the law which requires reporting is intended to be repealed. Though reporting is ending, nine years of focus and attention to medication errors has brought a new awareness of patient safety to NC nursing homes.

## Highlights

- A reduction in reporting of pharmacy dispensing errors has continued this year.

- Warfarin and insulin continue to be involved in large numbers of errors, many of those with serious outcomes.

- Warfarin errors are likely to be caused by transcription errors, communication problems, inadequate information, and shift change. These areas should be addressed if warfarin errors are common in your facility.

- Drugs in these classes—anxiolytics/sedatives/hypnotics, anti-diabetic agents, anticoagulants, anticonvulsants, and ophthalmic preparations—are more likely to be reported in errors after considering how often the various drug classes are used by nursing home residents.

- Medication errors still occur commonly during transitions from hospital, home or other facility. Attention to this area has reduced serious errors, but errors still commonly occur.

## Anti - Coagulation Research

MEQI staff has completed an analysis of the anticoagulant medication errors occurring over a two year period. Anticoagulant medications include warfarin, enoxaparin, and heparin. Warfarin is the most common drug involved in error in 2012. Research shows a relationship between this type of medication error and patient harm, and identifies areas nursing homes could target 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).

*Desai, R., Williams, C.E., Greene S.B., Pierson S. and Hansen R.A. "Anticoagulant medication errors in nursing homes: characters, causes, outcomes and association with patient harm", Journal of Healthcare Risk Management, (accepted for publication November 2012)*

## Therapeutic Class Research

In another analysis, MEQI staff identified 10 drug classes most frequently involved in medication errors. Patient characteristics and impact of these medication errors on patients were further examined. The MEQI data were combined with data from the 2004 National Nursing Home Survey (NNHS) to compare medication usage to medication error occurrence. There were 32,176 individual medication errors reported to MEQI in years 2010-11. The 10 drug classes most commonly involved in medication errors were analgesics (12.27%), anxiolytics/sedative/hypnotics (8.39%), anti-diabetic agents (5.86%), anticoagulants (5.04%), anticonvulsants (4.05%), antidepressants (4.05%), laxatives (3.13%), ophthalmic preparations (2.77%), antipsychotics (2.47%) and diuretics (2.34%). The analysis suggests that certain drug classes are more likely to be involved in medication errors in NH patients regardless of the extent of their use. The drug classes frequently and disproportionately involved in errors in nursing homes include anxiolytics/sedatives/hypnotics, anti-diabetic agents, anticoagulants, anticonvulsants, and ophthalmic preparations. Better understanding of the causes and prevention strategies to reduce these errors may improve NH patient safety.

*Desai, R., Williams, C.E., Greene S.B., Pierson S., Caprio A. and Hansen R.A. "Exploratory evaluation of medication classes most commonly involved in nursing home errors", Journal of the American Medical Directors Association, (accepted for publication November 2012)*

## Analgesics Research

MEQI staff also is in the process of conducting research focused on analgesic medication errors and their association with patient harm. A total of 32,176 individual medication error incidents were reported over a 2-year period in North Carolina nursing homes, 12.3% (n=3,949) of which were analgesic medication errors. Of these analgesic medication errors, opioid and non-opioid analgesics were involved in 3,105 and 844 errors respectively. The initial analysis indicates that opioid errors are more likely to be wrong drug errors, wrong dose errors, and administration errors compared to non-opioid errors (p<0.0001 for all comparisons), and had an increased likelihood of patient harm compared with non-opioid analgesics.

## FY 2012 Data Summary

This report provides data submitted during fiscal year 2012 (October 1, 2011 to September 30, 2012). For FY 2012, all North Carolina nursing homes submitted medication 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 1559, a range which is not correlated with the size of the facility. Sites are also asked to report if any medication-related liability claims had been filed against their facility during the year. One nursing home reported 2 medication-related liability claims in FY 2012.

A total of 14,526 error incidents were reported in FY 2012 by 398 nursing homes. The mean number of error incidents per nursing home was 36, with an average of 30 errors per 100 beds. The median number of errors was 19 per facility. This is a decrease of 2,465 reported errors from the FY2011 report (a 14.5 % decrease) for the same number of facilities. This decrease appears to be almost entirely attributed to two high volume reporting sites. The cause of the drop in reporting volume is unknown, though it could be related to turnover in a leadership position (director of nursing or administrator), or a change in how these facilities identify or report errors. The reduction is noticed primarily in outcome Category 2 (error occurred, but did not reach the patient) and in the 'wrong documentation' type of error.

| | | MEQI Reports<br>Summary Data<br>FY 2012 | | |
|---|---|---|---|---|
| | | | Fiscal Year | |
| | 2012 | 2011 | 2010 | 2009 |
| Number of nursing homes | 398 | 398 | 397 | 395 |
| Total number of error incidents | 14,526 | 16,974 | 15,202 | 14,395 |
| Number of error incidents with 1+ repeats | 4,988 | 5,270 | 5,456 | 5,064 |
| Total errors including repeats | 61,730 | 67,941 | 66,256 | 59,558 |
| Mean error incidents | 36 | 43 | 38 | 36 |
| Median error incidents | 19 | 21 | 20 | 22 |
| Incidents per 100 beds | 30 | 35 | 32 | 31 |

Of the 14,526 errors, 4,988 (34.3%) were repeated at least once and, for this year's data, there was an average of 12.3 repeats before the error was discovered. There were a total of 61,730 total repeat occurrences of errors including the original error, which is an average of 155 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.



MEQI Reports
Error Incidents per Nursing Home
FY 2012
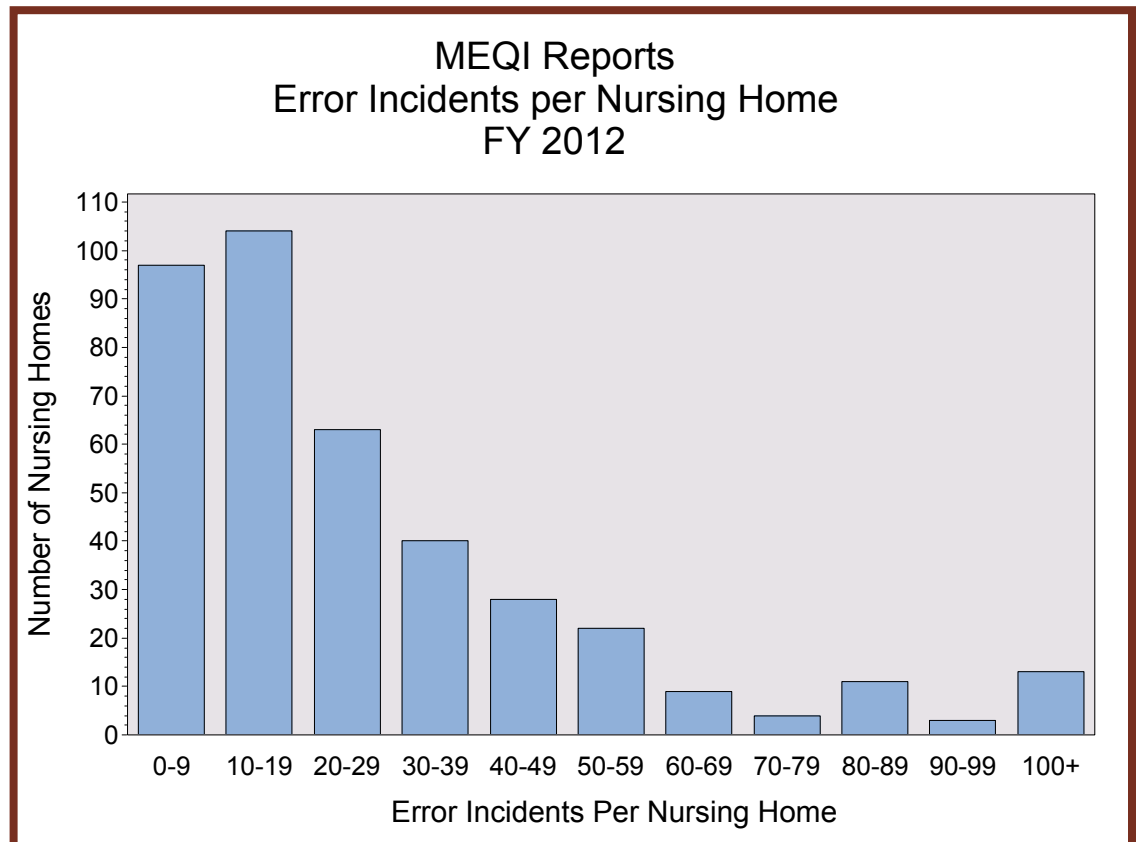
The data summary table shows results for the last four years, FY 2009 – FY 2012. A graph is also provided that shows the numbers of error incidents per nursing homes. This graph shows that about half of the nursing homes reported between 0 and 19 errors in FY 2011. Another 25% of homes reported between 20 and 39 errors, and the last 25% reported more than 40 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.

## 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.

| 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 |

| MEQI REPORTS<br>Patient Outcomes<br>FY 2012 | | | | |
|---|---|---|---|---|
| | Error Incidents | % | Repeat Errors | % |
| All Errors | 14,526 | 100.0 | 61,730 | 100.0 |
| Patient Outcome | | | | |
| 1=Capacity to cause error | 512 | 3.5 | 1,910 | 3.1 |
| 2=Did not reach patient | 674 | 4.6 | 1,761 | 2.9 |
| 3=Reached the patient but did not cause any harm | 12,026 | 82.8 | 52,216 | 84.6 |
| 4=Required monitoring/intervention to preclude harm | 1,193 | 8.2 | 5,295 | 8.6 |
| 5=Temporary harm to patient | 93 | 0.6 | 346 | 0.6 |
| 6=Temporary harm with trip to ER | 28 | 0.2 | 202 | 0.3 |
| 7=Permanent patient harm | 0 | 0.0 | 0 | 0.0 |
| 8=Intervention necessary to sustain life | 0 | 0.0 | 0 | 0.0 |
| 9=Patient death | 0 | 0.0 | 0 | 0.0 |

For FY 2012, 91.0% of errors were in the minor outcome categories and 9.0% were in the serious outcome categories. This is a slight increase in the percentage of serious errors from FY2011, but this is most likely related to the reduction of non-serious errors reported by two high volume nursing homes. Of the 91.0% minor errors, 8.1% were either a situation where there was a capacity for error, or the error was stopped before it reached the patient and 82.8% were errors that reached the patient, but caused no harm. Of the 9.0% serious outcome errors, nearly all were errors that required monitoring and/or intervention to preclude harm (8.2% of total). Only 121 errors (0.8%) lead to temporary harm to the patient (with or without ED visit). In 2012 there were no incidents reported in the three most serious patient outcome categories (permanent patient harm, intervention necessary to sustain life or death).

## Patient Characteristics

### Errors by Age Group and Gender

By age group, 15.5% of NC nursing home patients affected by medication errors this year are under 65 (2,246 errors), 19.3% between ages 65-74 (2,808 errors), 29.5% between the ages of 75-84 (4,287), and 32.2% 85 years or older (4,673). 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, 68.2% of the errors reported were for patients who were female and 28.2% 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. 27.9 % of errors involve residents identified as able to direct their own care, and 65.4% involve residents who are unable to direct their own care.

### 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 12.2% of error incidents. A total of 1,779 errors occurred in transition, 68 from home (0.5%), and 1,658 from hospital (11.4%) and 53 from another facility (0.4%). Over time we have seen a reduction in the number of serious errors in transition from both home and hospital–most likely due to the national focus on this topic and the new emphasis on reducing readmissions. This year there were more serious errors in transition from other facilities, with 26.4% of these errors in the serious category.

### 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 2012, 86.6% of errors were reported as skilled nursing, 4.9% in adult care, and 8.5% as unknown/not applicable.

## MEQI REPORTS
## Patient Characteristics
## FY 2012

| | Error Incidents | % | Repeat Errors | % | Minor % | Serious % |
|---|---|---|---|---|---|---|
| All Errors | 14,526 | 100.0 | 61,730 | 100.0 | 91.0 | 9.0 |
| Age Group | | | | | | |
| 64 yrs or younger | 2,246 | 15.5 | 10,067 | 16.3 | 92.1 | 7.9 |
| 65-74 years | 2,808 | 19.3 | 11,320 | 18.3 | 90.2 | 9.8 |
| 75-84 years | 4,287 | 29.5 | 18,216 | 29.5 | 90.7 | 9.3 |
| 85 years or older | 4,673 | 32.2 | 20,217 | 32.8 | 90.1 | 9.9 |
| na | 512 | 3.5 | 1,910 | 3.1 | 100.0 | 0 |
| Gender | | | | | | |
| Female | 9,913 | 68.2 | 41,305 | 66.9 | 90.7 | 9.3 |
| Male | 4,101 | 28.2 | 18,515 | 30.0 | 90.5 | 9.5 |
| na | 512 | 3.5 | 1,910 | 3.1 | 100.0 | 0 |
| Cognitive Ability | | | | | | |
| Patient able to direct own care | 4,049 | 27.9 | 16,264 | 26.3 | 89.6 | 10.4 |
| Patient unable to direct own care | 9,504 | 65.4 | 41,548 | 67.3 | 91.0 | 9.0 |
| Unknown | 461 | 3.2 | 2,008 | 3.3 | 91.3 | 8.7 |
| na | 512 | 3.5 | 1,910 | 3.1 | 100.0 | 0 |
| Number of Medications Daily | | | | | | |
| 01 - 05 meds | 214 | 1.5 | 751 | 1.2 | 93.5 | 6.5 |
| 06 - 10 meds | 1,199 | 8.3 | 4,673 | 7.6 | 87.3 | 12.7 |
| 11 - 15 meds | 1,395 | 9.6 | 6,326 | 10.2 | 86.6 | 13.4 |
| 16 - 20 meds | 587 | 4.0 | 3,517 | 5.7 | 89.4 | 10.6 |
| 20 or more meds | 240 | 1.7 | 1,114 | 1.8 | 85.4 | 14.6 |
| Not reported | 10,891 | 75.0 | 45,349 | 73.5 | 92.1 | 7.9 |
| Patient Transition | | | | | | |
| From Home | 68 | 0.5 | 326 | 0.5 | 86.8 | 13.2 |
| From Hospital | 1,658 | 11.4 | 10,129 | 16.4 | 88.8 | 11.2 |
| From Other facility | 53 | 0.4 | 503 | 0.8 | 73.6 | 26.4 |
| Not Transitioning | 12,747 | 87.8 | 50,772 | 82.2 | 91.3 | 8.7 |
| Bed Type | | | | | | |
| Adult Care Bed | 713 | 4.9 | 2,956 | 4.8 | 91.6 | 8.4 |
| Skilled Nursing | 12,576 | 86.6 | 52,092 | 84.4 | 90.6 | 9.4 |
| na | 1,237 | 8.5 | 6,682 | 10.8 | 94.0 | 6.0 |

## Types of Error

The two most common types of errors in 2012 remain dose omission and wrong documentation. Forty-four percent (6,438) are dose omission errors, and 19.1 percent are wrong documentation errors. Other commonly reported types of errors are overdose/multiple dose at 7.0%, wrong strength at 6.5%, wrong product at 4.0%, wrong patient at 3.5%, and wrong time at 3.1%. Wrong patient with 23.6% serious errors remains a continued area of concern, with very little change in the number of errors, or seriousness of errors, over time.

| | Error Incidents | % | Repeat Errors | % | Minor % | Serious % |
|---|---|---|---|---|---|---|
| **MEQI REPORTS** **Type of Error** **FY 2012** | | | | | | |
| All Errors | 14,526 | 100.0 | 61,730 | 100.0 | 91.0 | 9.0 |
| Type of Error | | | | | | |
| Dose Omission | 6,438 | 44.3 | 22,349 | 36.2 | 93.4 | 6.6 |
| Wrong documentation | 2,769 | 19.1 | 15,154 | 24.5 | 94.4 | 5.6 |
| Overdose | 1,014 | 7.0 | 5,688 | 9.2 | 83.8 | 16.2 |
| Wrong strength | 941 | 6.5 | 4,256 | 6.9 | 88.9 | 11.1 |
| Wrong product | 577 | 4.0 | 1,375 | 2.2 | 89.8 | 10.2 |
| Wrong patient | 512 | 3.5 | 845 | 1.4 | 76.4 | 23.6 |
| Wrong time | 447 | 3.1 | 1,530 | 2.5 | 91.9 | 8.1 |
| Underdose | 398 | 2.7 | 3,043 | 4.9 | 85.7 | 14.3 |
| Expired order | 338 | 2.3 | 2,989 | 4.8 | 93.5 | 6.5 |
| Labwork error | 277 | 1.9 | 423 | 0.7 | 85.2 | 14.8 |
| Monitoring error | 269 | 1.9 | 676 | 1.1 | 77.7 | 22.3 |
| Wrong duration | 266 | 1.8 | 2,409 | 3.9 | 92.5 | 7.5 |
| Wrong technique | 78 | 0.5 | 272 | 0.4 | 85.9 | 14.1 |
| Wrong form | 70 | 0.5 | 246 | 0.4 | 91.4 | 8.6 |
| Product Allergy | 48 | 0.3 | 111 | 0.2 | 77.1 | 22.9 |
| Wrong rate of administration | 38 | 0.3 | 170 | 0.3 | 78.9 | 21.1 |
| Expired product | 23 | 0.2 | 162 | 0.3 | 73.9 | 26.1 |
| Wrong route | 23 | 0.2 | 32 | 0.1 | 73.9 | 26.1 |

| | Error Incidents | % | Repeat Errors | % | Minor % | Serious % |
|---|---|---|---|---|---|---|
| **MEQI REPORTS** | | | | | | |
| **Medications Involved in Error** | | | | | | |
| **FY 2012** | | | | | | |
| All Errors | 14,526 | 100.0 | 61,730 | 100.0 | 91.0 | 9.0 |
| Medications | | | | | | |
| Warfarin | 786 | 5.4 | 1,890 | 3.1 | 69.1 | 30.9 |
| Insulin | 671 | 4.6 | 2,375 | 3.8 | 76.0 | 24.0 |
| Oxycodone | 466 | 3.2 | 1,212 | 2.0 | 90.8 | 9.2 |
| Hydrocodone | 446 | 3.1 | 1,198 | 1.9 | 93.3 | 6.7 |
| Lorazepam | 434 | 3.0 | 970 | 1.6 | 91.9 | 8.1 |
| Fentanyl | 308 | 2.1 | 370 | 0.6 | 84.1 | 15.9 |
| Furosemide | 302 | 2.1 | 1,678 | 2.7 | 87.7 | 12.3 |
| Alprazolam | 240 | 1.7 | 648 | 1.0 | 94.6 | 5.4 |
| Metoprolol | 236 | 1.6 | 1,134 | 1.8 | 92.4 | 7.6 |
| Omeprazole | 232 | 1.6 | 941 | 1.5 | 98.7 | 1.3 |
| Clonazepam | 216 | 1.5 | 546 | 0.9 | 92.6 | 7.4 |
| Aspirin | 207 | 1.4 | 1,855 | 3.0 | 97.1 | 2.9 |
| Potassium chloride | 192 | 1.3 | 955 | 1.5 | 93.2 | 6.8 |
| Levothyroxine | 189 | 1.3 | 811 | 1.3 | 94.2 | 5.8 |
| Polyethylene glycol | 154 | 1.1 | 838 | 1.4 | 97.4 | 2.6 |
| Zolpidem | 153 | 1.1 | 653 | 1.1 | 89.5 | 10.5 |
| Docusate | 146 | 1.0 | 821 | 1.3 | 98.6 | 1.4 |
| Morphine | 144 | 1.0 | 490 | 0.8 | 86.8 | 13.2 |
| Gabapentin | 142 | 1.0 | 760 | 1.2 | 97.9 | 2.1 |
| Mirtazapine | 139 | 1.0 | 786 | 1.3 | 98.6 | 1.4 |
| Quetiapine | 128 | 0.9 | 960 | 1.6 | 93.0 | 7.0 |
| Acetaminophen | 127 | 0.9 | 506 | 0.8 | 95.3 | 4.7 |
| Lisinopril | 125 | 0.9 | 611 | 1.0 | 91.2 | 8.8 |
| Simvastatin | 120 | 0.8 | 567 | 0.9 | 98.3 | 1.7 |
| Mmultivitamin | 119 | 0.8 | 420 | 0.7 | 97.5 | 2.5 |
| Calcium-vitamin D | 117 | 0.8 | 681 | 1.1 | 99.1 | 0.9 |
| Enoxaparin | 108 | 0.7 | 329 | 0.5 | 84.3 | 15.7 |
| Tramadol | 104 | 0.7 | 467 | 0.8 | 92.3 | 7.7 |
| Clonidine | 103 | 0.7 | 225 | 0.4 | 79.6 | 20.4 |
| *Other drug* | *7,672* | *52.8* | *36,033* | *58.3* | *93.6* | *6.7* |

## Medications Involved in Error

There were 654 different medications reported in errors for FY2012. 566 of these were reported in more than one error, and 309 in more than 5 errors. Warfarin (786) is the most common medication involved in errors, followed by insulin (671), oxycodone combinations (466), hydrocodone combinations (446), lorazepam (434) and fentanyl (308). Many of these common medications in NC nursing home errors also are 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 are controlled substances. The 29 most common types of medications involved in error incidents in NC are listed in the table. They each have over 100 errors and together account for nearly one half of all error incidents. Within this list there are three medications that are more than twice as likely to have serious outcomes: warfarin (30.9% serious), insulin (24% serious), and clonidine (20.4% serious).

### Therapeutic Class

Medications involved in error have been grouped by the therapeutic class codes found in the Multum Cerner medication database. The medications are grouped into seventeen different classes. Over one quarter (27.6%) of the errors (4,012) 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 cardiovascular agents (10.7%), metabolic agents (includes the various insulin products) (8.6%), nutritional products (8.5%), coagulation modifiers (8.3%), and gastrointestinal agents (7.7%). Coagulation modifiers (anticoagulants), which include warfarin, enoxaparin, and heparin, is the class with the most serious outcomes – with 22.2% of errors (268 serious errors) in this class leading to an error with an outcome category 4-9.

| MEQI REPORTS<br>Medications Involved in Error by<br>Therapeutic Class Name<br>FY 2012 | Error Incidents | % | Minor % | Serious % |
|---|---|---|---|---|
| All Errors | 14,526 | 100.0 | 91.0 | 9.0 |
| Therapeutic Class | | | | |
| central nervous system agents | 4,012 | 27.6 | 92.0 | 8.0 |
| cardiovascular agents | 1,551 | 10.7 | 90.0 | 10.0 |
| metabolic agents | 1,256 | 8.6 | 85.4 | 14.6 |
| nutritional products | 1,240 | 8.5 | 94.8 | 5.2 |
| coagulation modifiers | 1,207 | 8.3 | 77.4 | 22.6 |
| gastrointestinal agents | 1,116 | 7.7 | 97.4 | 2.6 |
| anti-infectives | 980 | 6.7 | 88.8 | 11.2 |
| psychotherapeutic agents | 916 | 6.3 | 94.0 | 6.0 |
| topical agents | 615 | 4.2 | 95.9 | 4.1 |
| miscellaneous agents | 448 | 3.1 | 93.5 | 6.5 |
| respiratory agents | 433 | 3.0 | 96.5 | 3.5 |
| hormones/hormone modifiers | 364 | 2.5 | 92.9 | 7.1 |
| biologicals | 95 | 0.7 | 88.4 | 11.6 |
| genitourinary tract agents | 90 | 0.6 | 95.6 | 4.4 |
| antineoplastics | 87 | 0.6 | 92.0 | 8.0 |
| alternative medicines | 77 | 0.5 | 98.7 | 1.3 |
| immunologic agents | 37 | 0.3 | 83.8 | 16.2 |
| radiologic agents | 2 | 0.0 | 100.0 | 0 |

# 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 2012, 13,572 or 93.0% of reported errors had no injury or physical effect. Only 1024 of the errors reported noted a physical effect of the error. The most common reported effect, with 341 errors (33% 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 (175) which is a test used to look at the effect of anticoagulants (such as warfarin) and blood clotting, increase or decrease in blood sugar (97) often found in conjunction with insulin use, pain (70), somnolence/lethargy (55), and change in blood pressure(55).

| MEQI REPORTS Effects of Error on Patient FY 2012 | | | | |
|---|---|---|---|---|
| | Error Incidents | % | Repeat Errors | % |
| All Errors | 14,596 | 100.0 | 62,150 | 100.0 |
| Effects | | | | |
| no injury or effect | 13,572 | 93.0 | 57,163 | 92.0 |
| Inadequate effect | 341 | 2.3 | 1,901 | 3.1 |
| PT/INR increase/decrease | 175 | 1.2 | 471 | 0.8 |
| Change in blood sugar | 97 | 0.7 | 481 | 0.8 |
| Pain | 70 | 0.5 | 166 | 0.3 |
| Somnolence/lethargy | 55 | 0.4 | 181 | 0.3 |
| Change in blood pressure | 55 | 0.4 | 218 | 0.4 |
| Excessive side effects | 34 | 0.2 | 143 | 0.2 |
| Agitation/anxiety | 30 | 0.2 | 179 | 0.3 |
| Sleep change | 30 | 0.2 | 95 | 0.2 |
| Mood change | 24 | 0.2 | 293 | 0.5 |
| Constipation/Diarrhea | 18 | 0.1 | 112 | 0.2 |
| Nausea/Vomiting | 15 | 0.1 | 71 | 0.1 |
| Weight change | 14 | 0.1 | 142 | 0.2 |
| Edema | 14 | 0.1 | 129 | 0.2 |
| Cognitive change | 11 | 0.1 | 80 | 0.1 |
| Respiratory distress | 9 | 0.1 | 16 | 0.0 |
| Allergic reaction | 7 | 0.0 | 12 | 0.0 |
| Fall | 6 | 0.0 | 51 | 0.1 |
| Appetite change | 4 | 0.0 | 81 | 0.1 |
| Wound/fracture/bruise | 4 | 0.0 | 8 | 0.0 |
| Seizure | 4 | 0.0 | 72 | 0.1 |
| Headache | 3 | 0.0 | 4 | 0.0 |
| Visual disturbance | 2 | 0.0 | 4 | 0.0 |
| GI bleed | 2 | 0.0 | 77 | 0.1 |

# Cause of Errors

The most commonly reported cause of error this year was 'staff did not follow policies and procedures', with 60.3% of errors reporting this as a cause. Other common causes include transcription error (21.7%), distractions on floor (4.9%), poor communication (2.9%), and medication unavailable (1.8%). These are the same five most common causes as in prior years. Each year there are different causes involved in serious error, with very little overlap from year to year. In 2012 there are four 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; poor communication (22.1% serious), too much workload/overtime (20.8 % serious), use of abbreviations (30% serious), and pharmacy delivered to wrong facility (33.3% serious).
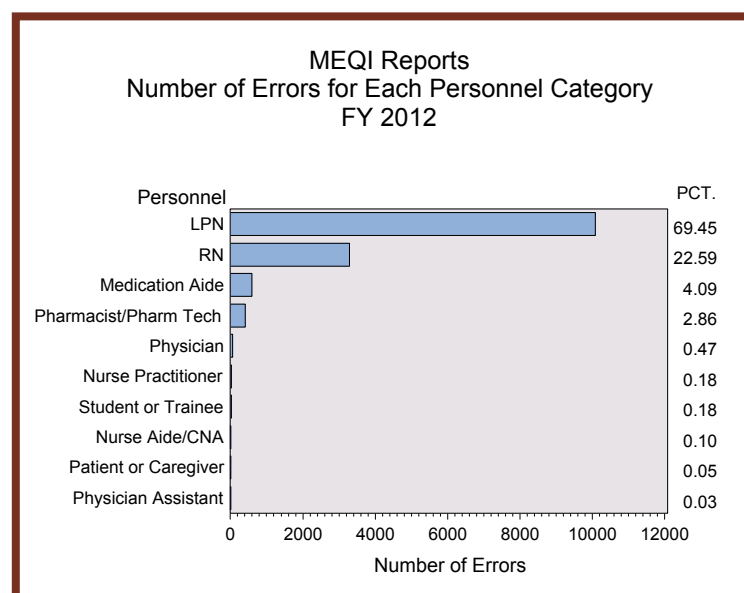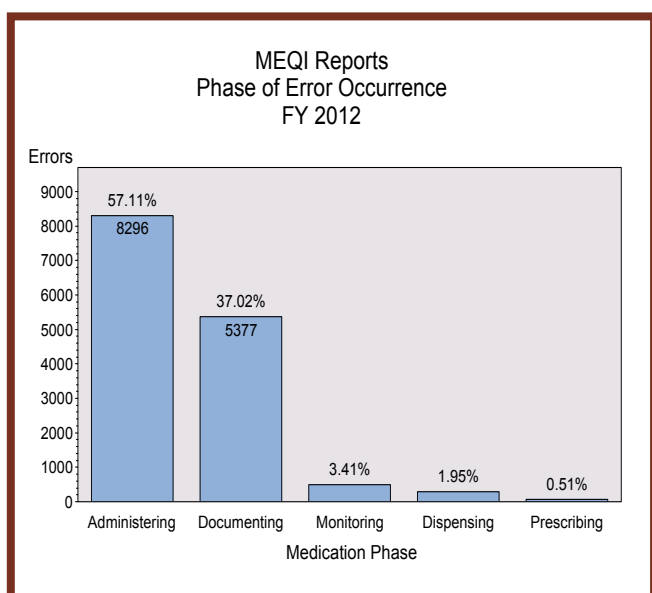
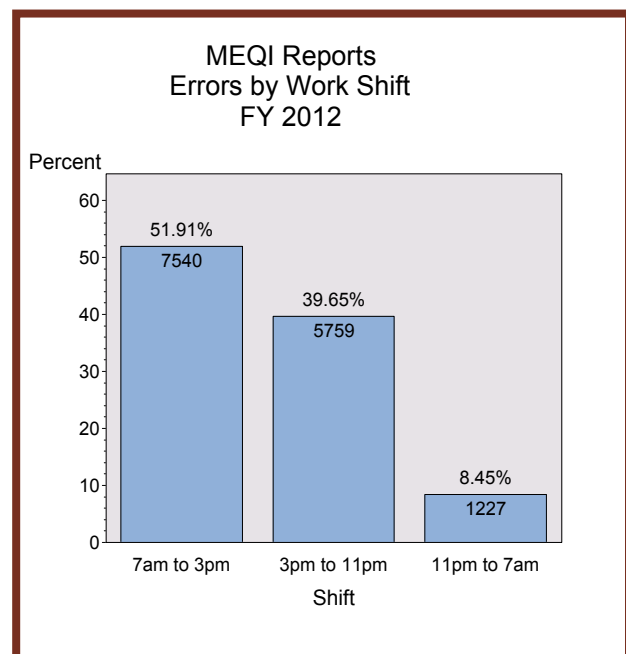| MEQI REPORTS<br>Cause of Error<br>FY 2012 | | | | | | |
|---|---|---|---|---|---|---|
| | Error Incidents | % | Repeat Errors | % | Minor % | Serious % |
| All Errors | 16,931 | 100.0 | 75,036 | 100.0 | 89.7 | 10.3 |
| **Primary Personnel** | | | | | | |
| Staff did not follow policies | 10,210 | 60.3 | 33,101 | 44.1 | 91.7 | 8.3 |
| Transcription error | 3,666 | 21.7 | 30,199 | 40.2 | 88.5 | 11.5 |
| Distractions on floor | 836 | 4.9 | 2,719 | 3.6 | 84.8 | 15.2 |
| Poor Communication | 485 | 2.9 | 2,113 | 2.8 | 77.9 | 22.1 |
| Med unavailable | 306 | 1.8 | 954 | 1.3 | 89.2 | 10.8 |
| Pharmacy dispensing | 243 | 1.4 | 1,548 | 2.1 | 89.3 | 10.7 |
| Name confusion | 205 | 1.2 | 644 | 0.9 | 86.8 | 13.2 |
| Current policies faulty | 143 | 0.8 | 490 | 0.7 | 82.5 | 17.5 |
| Inadequate info | 127 | 0.8 | 710 | 0.9 | 88.2 | 11.8 |
| Improper training | 121 | 0.7 | 276 | 0.4 | 84.3 | 15.7 |
| Package design | 108 | 0.6 | 207 | 0.3 | 82.4 | 17.6 |
| Pharm delivered wrong med | 90 | 0.5 | 495 | 0.7 | 90.0 | 10.0 |
| Shift change | 82 | 0.5 | 166 | 0.2 | 85.4 | 14.6 |
| Illegible handwriting | 75 | 0.4 | 751 | 1.0 | 86.7 | 13.3 |
| Product label | 71 | 0.4 | 314 | 0.4 | 90.1 | 9.9 |
| Too much workload/overtime | 48 | 0.3 | 137 | 0.2 | 79.2 | 20.8 |
| Exhaustion | 40 | 0.2 | 73 | 0.1 | 82.5 | 17.5 |
| Emergency on floor | 36 | 0.2 | 46 | 0.1 | 80.6 | 19.4 |
| Poor working conditions | 15 | 0.1 | 15 | 0.0 | 86.7 | 13.3 |
| Use of Abbreviations | 10 | 0.1 | 42 | 0.1 | 70.0 | 30.0 |
| Pharmacy closed | 8 | 0.0 | 16 | 0.0 | 87.5 | 12.5 |
| Pharm delivered to wrong facility | 6 | 0.0 | 20 | 0.0 | 66.7 | 33.3 |

## 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 57.1% in medication administration, 37% in the documentation phase, and 3.4% during the monitoring phase. The largest percentage of repeat errors continues to be those related to documentation; these account for over 63% of repeat errors. This year we saw an increase of serious errors in the monitoring phase–this is possibly related to the high number of errors in warfarin and insulin, both of which cause more serious errors and require a high level of monitoring. In 2012 only 0.5 % of the errors were reported in the prescribing phase (74 errors) and 1.9% in dispensing (283 errors). These two types of errors are usually reported in our system only if discovered or identified by nursing home staff. There was again a noticeable decrease in dispensing errors reported this year, from 4.8% of total in 2010 to 3.0% in 2011 and to 1.9% in 2012.

| MEQI REPORTS Phase of Error Occurence FY 2011 | | | | | |
|---|---|---|---|---|---|
| | Error Incidents | % | Repeat Errors | % | Minor % | Serious % |
| All Errors | 14,526 | 100.0 | 61,730 | 100.0 | 91.0 | 9.0 |
| **Phase** | | | | | | |
| Administering | 8,296 | 57.1 | 19,372 | 31.4 | 90.9 | 9.1 |
| Documenting | 5,377 | 37.0 | 39,000 | 63.2 | 91.9 | 8.1 |
| Monitoring | 496 | 3.4 | 855 | 1.4 | 81.5 | 18.5 |
| Dispensing | 283 | 1.9 | 1,825 | 3.0 | 89.4 | 10.6 |
| Prescribing | 74 | 0.5 | 678 | 1.1 | 93.2 | 6.8 |

MEQI Reports
Phase of Error Occurrence
FY 2012

MEQI Reports
Number of Errors for Each Personnel Category
FY 2012

## Personnel Involved in Error

Nurses, both RN and LPN, are primarily responsible for the delivery of medications in nursing homes. In 2012 LPNs, who are the most common caregivers and were involved in most medication error incident reports (69.4%), while RNs were involved in 22.6%. Medication aides were involved in 4.1% of errors. Pharmacists or pharmacy staff account for another 2.9% of errors (a reduction from 5.1% in 2010, then 3.5% in 2011). In 161 errors (1.1%) the primary personnel involved in the error was listed as a temporary, contract, or agency staff. Students/trainees or patient/caregiver errors are often more serious, but account for very few errors.

MEQI Reports
Errors by Work Shift
FY 2012

15

| MEQI REPORTS<br>Personnel<br>FY 2012 | | | | | | |
|---|---|---|---|---|---|---|
| | Error Incidents | % | Repeat Errors | % | Minor % | Serious % |
| All Errors | 14,526 | 100.0 | 61,730 | 100.0 | 91.0 | 9.0 |
| **Primary Personnel** | | | | | | |
| LPN | 10,088 | 69.4 | 41,976 | 68.0 | 91.5 | 8.5 |
| RN | 3,281 | 22.6 | 13,577 | 22.0 | 89.8 | 10.2 |
| Medication Aide | 594 | 4.1 | 2,076 | 3.4 | 90.2 | 9.8 |
| Pharmacist/Pharm Tech | 416 | 2.9 | 2,688 | 4.4 | 89.9 | 10.1 |
| Physician | 68 | 0.5 | 787 | 1.3 | 94.1 | 5.9 |
| Nurse Practitioner | 26 | 0.2 | 155 | 0.3 | 92.3 | 7.7 |
| Student or Trainee | 26 | 0.2 | 51 | 0.1 | 50.0 | 50.0 |
| Nurse Aide/CNA | 15 | 0.1 | 292 | 0.5 | 93.3 | 6.7 |
| Patient or Caregiver | 7 | 0.0 | 19 | 0.0 | 71.4 | 28.6 |
| Physician Assistant | 5 | 0.0 | 109 | 0.2 | 100.0 | 0.0 |
| **Primary Personnel involved was temporary or contract staff at time of error** | | | | | | |
| No | 14,243 | 98.1 | 59,648 | 96.6 | 90.9 | 9.1 |
| Yes | 161 | 1.1 | 574 | 0.9 | 88.2 | 11.8 |
| Unknown | 122 | 0.8 | 1,508 | 2.4 | 95.1 | 4.9 |

## Work Shift

Each error is also assigned to the work shift in which the error occurred, or if unknown, the shift where the error was identified. About half (51.9%) of all errors continue to be noted as day shift incidents (7am to 3pm). Another 39.6% were noted as the afternoon/evening shift incidents (3pm to 11pm). A smaller number of errors (8.4%) 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 2012 there was little variation in serious outcomes among shifts.

| MEQI REPORTS<br>Work Shift of Error Occurrence<br>FY 2012 | | | | | | |
|---|---|---|---|---|---|---|
| | Error Incidents | % | Repeat Errors | % | Minor % | Serious % |
| All Errors | 14,526 | 100.0 | 61,730 | 100.0 | 91.0 | 9.0 |
| **Work Shift** | | | | | | |
| 7am to 3pm | 7,540 | 51.9 | 38,372 | 62.2 | 91.3 | 8.7 |
| 3pm to 11pm | 5,759 | 39.6 | 20,318 | 32.9 | 90.7 | 9.3 |
| 11pm to 7am | 1,227 | 8.4 | 3,040 | 4.9 | 89.8 | 10.2 |

## Conclusion

The MEQI project has now collected medication errors from nursing homes for nine years. This is the final year of data collection for the project. What began with a simple online year end form has expanded to include an individual error entry system that could be used year-round. Over time we added site specific summary data reports, graphic reports, and a toolkit, all to enhance the user experience. Many of the 400 nursing homes participated with us in making these changes, responding to surveys and participating in pilot tests and key informant interviews to give us feedback and improve the system.

Most errors reported to the MEQI system over time have not harmed the patient, and have resulted in no injury or effect on the patient. It is a small number of errors, around 9% that are an area for concern, and a smaller percentage yet, about 1% that lead to what most national definitions would consider to be patient harm. The goal of most nursing homes should be to address system issues that lead to the repetition of the most harmful medication errors. It is also clear that facilities have varying ideas about what an error is, and interpret reportable error guidelines differently from one another. Some homes consistently report under 20 errors per year (in some cases 0), and some report over 1000 errors per year. This understanding of reporting does not, as far as we can tell, relate to the quality of any particular nursing home, but rather to the leadership staff and how they interpret the guidance provided. Error report numbers on a facility level are not useful for determining facility quality, but on a larger scale can provide valuable information on specific medications, and types of error for targeting interventions.

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